AMERICAN

DYESTUFF REPORTER

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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

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MARCH 3, 1952
VOLUME 41 NUMBER 5

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in "strength"

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Proceedings of the
American Association of Textile Chemists and Colorists

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MARCH 3, 1952

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Calendar of Future Meetings

COUNCIL: April 18 and June 13 (New York); Sept 19 (Philadelphia); Nov 6 (Boston).

GENERAL RESEARCH COMMITTEE: Dates and sites are the same as the Council's.

NATIONAL CONVENTIONS: 1952—November 6-8, Boston, Mass; 1953—Sept 17-19, Hotel Conrad Hilton, Chicago, Ill; 1954—Atlanta, Ga.

HUDSON-MOHAWK SECTION: Mar 21, May 2 (Jack's Restaurant, Albany, N Y); June 20 (Annual Outing).

MID-WEST SECTION: April 19 (Cincinnati, O); June 14 (Lake Lawn Lodge, Delavan, Wisc); October 4 (Hotel Bismarck, Chicago, Ill).

NEW YORK SECTION: March 21 (Fairleigh-Dickinson College, Rutherford, N J); April 18 (Swiss Chalet); May 16 (Swiss Chalet); June 20 (Outing).

NORTHERN NEW ENGLAND SECTION: Mar 7 (MIT); April 18 (LTI); May 16 (Andover Country Club); June 6 (Annual Outing, Merrimack Valley Country Club); Dec 6 (1952 Annual Meeting, LTI).

PACIFIC SOUTHWEST SECTION: March 28, 1952.

PHILADELPHIA SECTION: March 7 (Penn-Sheraton Hotel, Philadelphia); April 25 (Abraham Lincoln Hotel, Reading, Pa); June 13 (Outing, Lu Lu Temple Country Club, North Hills, Pa).

PIEDMONT SECTION: April 25-26 (Clemson Hotel, Clemson, S C); June 6-7 (Ocean Forest Hotel, Myrtle Beach, S C); Sept. 12-13 (Hotel Charlotte, Charlotte, N C).

RHODE ISLAND SECTION: Mar 28 (Providence Engineering Society); April 25 (Wannamoisett Country Club); May 23 (Providence Engineering Society); June 6 (Annual Outing—Wannamoisett Country Club); Oct 24 (Providence Engineering Society); Dec 5 (Annual Meeting, Sheraton-Biltmore, Providence).

SOUTH CENTRAL SECTION: May 17 (Patten Hotel, Chattanooga, Tenn); Aug 22-23 (Summer Outing, Chattanooga Golf and Country Club); Dec 6 (Patten Hotel).

WESTERN NEW ENGLAND SECTION: March 14 (Shelton, Conn); May 2 (Ladies Night, Cheshire, Conn); June 20 (Outing); Oct 3, Nov 14 and Dec 12 (Rapp's).

ONE HUNDRED AND EIGHTIETH COUNCIL MEETING

THE Council held its 180th meeting in the Hotel Commodore, New York, N Y, on Friday morning, January 18, 1952. Present were President C Norris Rabold, presiding; Arthur T Brainerd, Arthur W Etchells, Samuel L Hayes and Raymond W Jacoby, Vice Presidents; William R Moorhouse, Treasurer; Leonard S Little, Chairman of the Research Committee; William D Appel, William H Cady, Carl Z Draves and P J Wood, Past Presidents; Edward B Bell, John M Gould and Frank J O'Neil representing Northern New England; Edward J Allard, Robert W Joerger and Alden D Nute representing Rhode Island; J Edward Lynn representing Western New England; Carl H Brubaker, Charles W Dorn, Ralph M Fischer, Weldon G Helmus, Paul J Luck and Henry L Young representing New York; Jack Epelberg representing Hudson-Mohawk; James Dixon, A E Raimo, Ernest E Rettberg, Jr, Richard B Stehle, Charles A Sylvester and Jackson A Woodruff representing Philadelphia; Sumner H Williams representing Piedmont; Glenn R Bellamy representing South Central; Joseph H Jones representing Mid-West; Kenneth H Barnard of the Convention Committee; George L Baxter and C T Anderson of the Corporate Membership Committee; John N Dalton; William A Holst of the Committee on Constitution and Bylaws; Edwin R Laughlin of the Colour Index Committee; George H Schuler and Glenn D Jackson, Jr of the Publicity Committee; Albert E Sampson, Assistant Treasurer; Harold W Stiegler, Research Director; Percival Theel of the Publications Committee; and Harold C Chapin, Secretary.

The Secretary's report of the 179th Council meeting and financial report of December 31, 1951, and the Treasurer's report of January 2, were accepted. The President introduced the Vice Presidents and Councilors, and expressed thanks for the confidence implied in his re-election.

Committees were appointed, or stand, as follows—

EXECUTIVE COMMITTEE ON RESEARCH
L S Little, *Chairman*

W D Appel	H F Herrmann
J R Bonnar	C N Rabold
J N Dalton	W M Scott
C W Dorn	J A Stevenson

PUBLICITY
G H Schuler, *Chairman*
G D Jackson, Jr, *Vice Chairman*
Others to be appointed by local Sections.

APPROPRIATIONS
W R Moorhouse, *Chairman*

H C Chapin	T R Smith
C Z Draves	P J Wood

MEMBERSHIP AND LOCAL SECTIONS
R W Jacoby, *Chairman*

A T Brainerd	A W Etchells
H C Chapin	S L Hayes

PUBLICATIONS
P Theel, *Chairman*
W H Cady, *Editor of Technical Manual and Year Book*
C Z Draves, *Editor of Proceedings*

H C Chapin	P J Luck
R W Jacoby	C N Rabold
H Y Jennings	G H Schuler
N A Johnson	

CORPORATE MEMBERSHIPS
G L Baxter, *Chairman*

C T Anderson	J E Lynn
E B Brearley	R P Monsaert, Jr
E S Chapin	E Morrill
E A Chevrette	R H Souther
C B Fieldhouse	H Whelchel
R L Horney	R P Wood

CONSTITUTION AND BYLAWS
H C Chapin, *Chairman*

W A Holst, Jr	P Theel

TECHNICAL SUPPLIES
C N Rabold, *Chairman*

H C Chapin	W R Moorhouse
L S Little	H W Stiegler

SECRETARY'S FINANCIAL REPORT—DECEMBER 31, 1951

	Applications	*Dues, Regular & Reinstate*	*Dues, Corporate & Sustaining*	*Miscellaneous*	*Totals*
Reecived and transmitted to Treasurer					
August 1 to October 31, 1951	$1,182.00	$19,112.00	$ 1,072.50	$4,018.66	$25,385.16
October 31 to December 31, 1951	1,445.00	14,281.50	16,312.50	4,029.50*	36,068.59
Total in fiscal year to December 31	2,627.00	33,393.50	17,385.00	8,048.25	61,453.75
Leaving deposited by Treasurer with Secretary					4,146.62
For comparison, same date last year	2,148.00	31,444.50	20,997.50	10,484.25	65,074.25

Miscellaneous items		*
Dividends	$	228.90
American Dyestuff Reporter Award funds		1,127.50
New York Section, return of reimbursement		592.25
Reporters and reprints		18.35
Year Books		527.91
Crockmeters		449.18
Crock cloth		498.00
Water test apparatus		96.35
Dyed standards		73.00
Moth cloth		98.25
Knitted tubing		24.00
Buttons		8.00
Color transfer charts		72.50
Flammability apparatus		4.00
Colour Index		60.00
Standard grease wool		22.50
Analytical Methods		128.90
		$4,029.59

H C CHAPIN,
Secretary.

CONVENTIONS

K H Barnard, *Chairman*

For two years:

E W Camp	S L Hayes
W F Fancourt 3rd	G H Wood

For four years:

C W Dorn	J H Jones
C R Gill	G O Linberg

TECHNICAL PROGRAMS

R B Finch, *Chairman*

K H Barnard	V B Holland
H Boxser	W A Holst, Jr
M A Dahlen	R W Jacoby
F Dannerth	A D Nute
S J Davis	W G Parks
A W Etchells	E R Kaswell
H E Hager	S H Williams

INTERSECTIONAL CONTEST

F J O'Neil, *Chairman*

J R Bonnar	E D McLeod
J M Gould	T R Smith
K A Howry	J A Woodruff

PRESIDENT'S ADVISORY COMMITTEE

S L Hayes, *Chairman*

W D Appel	R W Jacoby
J R Bonnar	G O Linberg
A T Brainerd	L S Little
H C Chapin	W R Moorhouse
A W Etchells	T R Smith
H F Herrmann	

BIBLIOGRAPHY

W H Cady, *Chairman*

A G Bruinier, Jr	G J Mandikos
T R Foltz, Jr	J F Oesterling
M S Furry	E L Phelps
L Fusser	J W Place, Jr
R D Greene	R W Sumner
R W Joerger	G R Thompson
C A Jones	F Tripp
J H Kettering	P Walrath
P G Kolupaev	G F Walz
V I McLendon	R K Worner
A R Macormac	A S Wrigley

COLOUR INDEX

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E R Laughlin, *Secretary*

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J R Bonnar	A Morrison
H M Chase	A L Peiker
A F Clark	R W Powell
J L Crist	C H A Schmitt
R E Derby	T R Smith
F R Haigh	B M Van Cleve
W A Holst, Jr	W von Bergen
R W Jacoby	P J Wood
D P Knowland	

Steering Committee

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J R Bonnar	E R Laughlin
W A Holst, Jr	A L Peiker

Sub-committee on Classification & Numbering

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W A Holst, Jr	E R Laughlin

Sub-committee on Fastness

W H Cady, *Chairman*

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L Fusser	R W Powell
A K Gyzander	C A Seibert

Sub-committee on Properties Other Than Fastness

W H Cady, *Chairman*

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E C Hansen	C A Sylvester

Sub-committee on Co-ordination of Data

G H Schuler, *Chairman*

L Fusser	A L Peiker
D P Knowland	C H A Schmitt
J E Loughlin	M G Stern

The contract with the Society of Dyers and Colourists for publication of the *Colour Index,* previously approved by letter ballot of the Council, was signed in the meeting. Paper was selected, and would be ordered in this country as soon as an import license could be arranged in England.

In the coming *Year Book,* Professor Theel stated, the Colour Index numbers of dyestuffs would be corrected by Mr Cady where necessary, despite the fact that full revision of the list is not due until next year. Advertisements would be inserted directly after Textile Chemical Specialties, with Corporate and Sustaining members, address list of personal members, geographical classification and index following in that order. The Vat Monograph manuscript was complete except for bibliography and index. The pamphlet on Dyehouse Mathematics was ready for the printer, but was being circulated among the editing committee for comment. The choice of the recipient of this year's American Dyestuff Reporter award was to be left to what was formerly the "Screening Committee". To this Committee the Publications Committee had appointed H M Chase for one year, Professor Ethel L Phelps for two years, and J N Dalton for three years, so as to permit one three year appointment annually in the future. In publication of the Proceedings in the *Reporter,* requests for protection of patented trade names would be satisfied hereafter by capitalizing the name, and on each page of its appearance adding the common generic term as well as a footnote of explanation.

Mr Baxter, new Chairman of the Corporate Membership Committee, expressed the hope of keeping his solicitors better informed of research in progress.

Mr Little cited the intense popular clamor, at the moment, for legislation against inflammable textiles. The executive Committee on Research planned immediate further publicity for our flammability test as a means to sane specifications. It was voted that this be changed in classification from Tentative to a Standard Method of the Association, and so offered to the American Standards Association, which had expressed interest in adopting it. Mr Seibert's work on comparative fading under lamps and sunlight was continuing. Preparations for I S O committee meetings in New York in June were well under way. Various current activities in Lowell were discussed by Dr Stiegler.

Mr Schuler reported further favorable response from getting New York convention papers to the press, and outlined a plan for rendering such service more economically at the Boston convention. Mr Barnard reported for the newly-organized Convention Committee, and outlined plans for the Boston convention of November 6 to 8, including a Pops Concert, one banquet, two general lunches and a single session technical program. For next year's convention in Chicago, Mr Jones said that our headquarters had been changed in name only, from the Stevens to the Conrad Hilton.

The April 18 meeting of the Council will be in the Commodore in New York. The date of the June meeting in New York has been changed to June 13.

Elected to Corporate membership were Bersworth Chemical Company and Worth Chemical Corporation. Presented by Mr Jacoby for the Membership Committee, each of the following was elected to the class membership specified, as of thirty days from publication of application, provided no objection be received meanwhile by the Secretary.

SENIOR

C D Allen	R A Duchacek
H W Bagley	F H Dudley
J L Beadle	T W Durand
H Berman	C S Fargo
L G Blomquist	G S Fauby
M Q Branniff	G Fox
F E Bredin	C B Geib
W H Brodnitz	P Gerson
S M Browning	F Grether
G Centola	A Grosswirth
D A Corona	C A Hastings
W A Corry	W L Hayes
A Cresswell	C Hornstein
B W Crowe	A Howarth
N Cryer	D F Hutchison
O T D'Allessio	A P Hyde
E P Dougherty	L H James

(Concluded on Page P143)

ONE HUNDRED AND SEVENTIETH GENERAL RESEARCH COMMITTEE MEETING

THE 170th meeting of the General Research Committee was held at the Hotel Commodore, New York, N Y, on Friday, January 18, 1952.

The meeting was called to order by the Chairman, L S Little, at 1:30 pm. Mr Little referred to his report to the Council that morning and presented three matters to the Committee:

1. Our present tentative flammability standard was adopted as a standard test method. The tentative method has been in effect long enough to get the benefit of all reactions and this action of the committee will permit its inclusion in the forthcoming *Year Book* as a standard test method.

2. The committee agreed that the Standard Flammability Test Method should be sent to Committee L-14 of the American Standards Association with the suggestion that they consider it for adoption as an official American standard.

3. Council had voted to continue our membership in the American Standards Association for another year.

Mr Little discussed in some detail the recent widespread experience with inflammable sweaters made of brushed rayon, the impact of this development upon the political authorities and their probable reaction to the importance of our flammability tester in permitting the political authorities to frame appropriate legislation. He also stated that because of this recent development the Executive Committee on Research had decided to republish previous data on flame resistance as a release to corporate members and members of the Council and General Research Committee, using the new report cover which had been developed for this purpose. It is expected that this publication will be issued shortly.

Mr Little then advised the Committee of the meeting of the Executive Research Committee held the previous evening at which the four new vice presidents were present, and to which chairmen of the Sectional Advisory Research Committees had been invited. He explained the conclusion that had been reached which provides for closer contact on the part of Dr Stiegler with the Sectional Advisory Research Committees. This is to start promptly. He announced that the new bleaching subcommittee under chairmanship of Mr Bell had been organized and had started work. In addition it was his intention to revive the subcommittee on the identification of finishes and to appoint in the near future a new chairman of that committee. Mr Little explained that the present rate of activity at Lowell is being held within a budget of approximately $45,000 to $50,000 per year, and that this rate of expenditure will not be increased until additional funds are actually in hand or a very definite prospect. As soon as additional funds are available one of the first matters to receive attention will be the securing of an assistant for our research director.

Mr Little then referred to the work that had been completed since the last meeting on the I S O standards and also to Mr Seibert's work involving the exposure of samples to Florida sunlight and comparing them with Fade-Ometer exposures. He also referred to the forthcoming meeting in this country, probably at Columbia University in June, of the International Standards Organization, and asked the committee chairmen to review their methods so that they will be ready for consideration by that group at the time of the meeting. He announced that the next meeting of the General Research Committee will be held April 18 in New York at the Hotel Commodore. The meeting was then turned over to Harold W Stiegler, who explained what he and his associates had been doing at Lowell since the last meeting.

During his discussion, Dr Stiegler brought out the fact that in response to his recent request, he is getting definite improvement in the number of returns of votes on new methods; he particularly welcomes comments which the members may submit with their votes.

Dr Stiegler has been busy on promotional activities, refining our methods with particular reference to I S O matters. The group at Lowell has been active in connection with the work of the Subcommittees on Wash Fastness, Rapid Control Tests, Gas Fading, Perspiration, etc. The data for the *1952 Year Book* has been in active preparation and no particular deadline has been set up but it is stated that the data is needed now. Dr Stiegler also referred to the fact that the Executive Committee on Research had voted to have an exhibit booth at the annual meeting of the Canadian Association of Textile Chemists and Colourists in Montreal, April 25 and 26, 1952, and also a booth at the American Home Economics Convention in Atlantic City this summer. This latter group has 60,000 members, plus 40,000 student members.

Dr Stiegler then called for a report from the Subcommittee on Continuous Wool Scouring. E A Leonard, Chairman, reported that currently this committee is studying the variability of results in raw wool scouring tests, and also the application to oiled yarn of the continuous scouring test for determining scourability of spinning lubricant. Samples of oils have been distributed among committee members for their trial. Mr Leonard stated that the recently announced test method of this committee appears to be gaining acceptance in the trade.

F J O'Neil, Chairman of the Subcommittee on Visual Aids, pointed out that this committee needs a new chairman, as he has served slightly more than the statutory time. In spite of all the work that this committee has done, it has not as yet found a simple method, but has uncovered considerable confusion due to shortcomings of available visual aids. Apparently any improvement over that which can be accomplished by the human eye involves the expenditure of considerable sums for instruments, and the objective of Mr O'Neil's committee is to find something simple that can be used by untrained people in the industry.

A D Nute, Chairman of the Subcommittee on Durable Finishes stated that his committee has selected 90 per cent relative humidity and a temperature of 70°F as the standard conditions under which their work will be done. This very active committee met the day before with 12 members present.

T E Bell, Chairman of the Subcommittee on Bleaching, reported that his committee is just getting organized and that they have invited 14 members and had a number of acceptances.

C A Sylvester, Chairman of the Subcommittee on Wash Fastness, stated that his committee had had a meeting the

previous day at which the commercially-laundered fabrics were reviewed. In counterdistinction to some previous experience, this group of fabrics did not show pronounced differences among the various laundries which had done the work. This program is directed to the development of a wash test with chlorine. An interlaboratory survey is planned which should result in a tentative method in the not too distant future. Mr Sylvester's committee had also considered the elimination of the acid sour in the No. 1 Cotton Wash Test. After discussion, the committee voted unanimously to continue the acid sour in that test. Mr Dorn commented on the new III-A test saying that some confusion had been caused by those who had used the test and were evaluating the results on the basis of a perceptible change. Mr Sylvester stated that this more vigorous test needs somewhat wider tolerance in variation and urged that the three colored standards that had been set up for the purpose of evaluating this test be adopted by all people using it.

In the absence of the Chairman of the Subcommittee on Chlorine Retention, Dr Stiegler read a communication from Dr Epelberg which was in answer to a question that had been presented to the committee. Dr Epelberg stated that the three minute treatment in boiling water will not remove sufficient resin to permit an unsatisfactory fabric to pass the test. The inquirer had been somewhat concerned over that one factor of the test.

W A Wardell, Chairman of the Subcommittee on Desizing, was not present, but had submitted a report to Dr Stiegler which was read. A new chairman has been announced for this committee, Dr Sutton Redfern. Thus far this committee has completed the bibliography dealing with the subject of their investigation, and expects to submit that bibliography for publication in the near future. Work has been started on the project planning to evaluate enzymes as agents for removing size from fabric.

M J Babey, Chairman of the Subcommittee on Light Fastness, stated that the new *Year Book* will contain the newly-revised method for color fastness to light and this will cover only the carbon arc method of testing. The new *Year Book* will also contain the same sunlight test method that appears in the 1951 edition. When Mr Seibert completes his present research work it is expected that the sunlight test method will be revised. Approximately 100 dyed samples of various synthetics have been turned over to him for his comparative Fade-Ometer-Florida Sunlight tests.

G A Slowinske, Chairman of the Subcommittee on Water Resistance, reported that his committee had met the previous day and had elected a new chairman, Carl R Bellwood. It had been voted to recommend the adoption as a tentative standard test of the Army Dynamic Absorption Test. This test is tentative with the A S T M and is included among those in CCC-T-191b. Upon motion by Mr Slowinske the General Research Committee accepted this recommendation. The committee has a new member (Herman D Goldstein) and plans to request a member on the committee from the Philadelphia Quartermaster Depot. For the future it has under consideration the development of data to justify dropping the tentative Impact Penetration Test and to study the Suter Hydrostatic Pressure Test. It is apparent in this case that erratic results are experienced if the delivery of water to the tester is not standardized. Since the present stock of nozzles for the spray tester is exhausted, it is necessary that a new supply be arranged, if possible under present conditions. This committee also will do work to determine the possibility of adopting the rain tester to test the water repellency of seams in garments. In connection with this, Mr Little brought up the preference of the English for the Bundesman test. Mr Slowinske explained at length the work which had been done some years ago comparing the results of the Bundesman test with those of the rain tester. Though not discrediting the Bundesman test, it appears that under the conditions of the program at that time the rain tester gave better correlation with actual experience.

John Dalton, Chairman of the Subcommittee on Fastness to Perspiration, moved that the present tentative plate method be adopted as an official standard. The motion passed. Mr Dalton also moved that the test tube method, previously the standard method, be made obsolete. This motion also passed. These matters will be presented to the Council for final disposition at the April meeting.

In the absence of J F Warner, Chairman, who had to leave the meeting early, K H Barnard stated that the Subcommittee on Dimensional Change is still at work studying details of their method but are not altering the approach in principle.

A E Johnson, Chairman of the Subcommittee on Dry Cleaning, stated that the first phase of their program has been completed and that at present the committee is having some difficulty locating suitable fabrics for their further work. However, he reported that he is expecting some help in this direction from one of the large suppliers. He also reported that he cannot yet present a method suitable for consideration by the International Standards Organization. Mr Little expressed the hope that he will be ready for that in time for the June meeting.

There followed considerable discussion on points of procedure with particular reference to the relations of the General Research Committee to the Council of the Association. It was evident that this matter did not particularly concern the members of the General Research Committee and it is doubtful that there would be any immediate changes in procedure or further consideration on future action.

There being no further business, Mr Little closed the meeting at 3:35 pm.

Those present included:

L S Little, Chairman
H W Stiegler, Research Director
G H Schuler, Secretary

E J Allard
W D Appel
M J Babey
K H Barnard
E B Bell
T E Bell
J R Bonnar
F Bonnet
C H Brubaker
W H Cady
H C Chapin
J N Dalton
C W Dorn
C Z Draves
J Epelberg
J M Gould
H E Hager
S L Hayes
W A Holst
R W Jacoby
R W Joerger
A E Johnson
P J Kennedy
D P Knowland
E A Leonard
J E Lynn
J E Norton
A D Nute
F J O'Neil
A E Raimo
B A Ryberg
A E Sampson
C H A Schmitt
J H Skinkle
G A Slowinske
R B Smith
R B Stehle
C A Sylvester
P Theel
F Tripp
W Von Bergen
J F Warner
H E Wilde
S H Williams
P J Wood
J A Woodruff
J A Zelek

LAPEL BUTTONS FOR MEMBERS

These buttons bear the seal of the AATCC and may be purchased by members in good standing from the National Secretary at $2.00 each.

DR HAROLD C CHAPIN
Lowell Textile Institute
Lowell, Massachusetts

Southeastern Section—

A REVIEW OF FLAME-RESISTANT TREATMENTS*

K H BARNARD

Textile Resin Lab
Calco Chemical Division
American Cyanamid Company

Kenneth H Barnard

Flammable textiles have not only been the cause of large-scale holocausts, such as the circus fire in Hartford and the Coconut Grove night-club fire in Boston, but recently have caused individual tragedies to those who have worn brushed-rayon sweaters. The author points out that formerly only water-soluble, nondurable fire-retardant finishes were available to reduce the flammability of unsafe textiles. The most common of these treatments were ammonium phosphate, ammonium sulfamate, and a mixture 30% of boric acid and 70% of borax. The bother and cost of retreatment, however, have mitigated against the use of these effective but nondurable treatments.

Now fire-retardant finishes of considerable resistance to water and to washing in neutral solution and with good retention of drape and handle are available. Resistance to high-temperature commercial laundering with alkaline detergent solutions, however, is not claimed for these new treatments. The application of Pyroset DO, one of these new durable fire-retardant finishes and its testing are discussed. The reader is finally exhorted to an appreciation of the great field of usefulness of durable fire-retardants.

INTRODUCTION

AS YOU have a full program and some very important finishes to consider, it is my problem so to condense my particular subject that you may still get some benefit out of it. Disaster from fires in public places is too familiar to dwell on in detail here, but I must point out that the saddest and most serious losses of life were due to flammable textiles. A spark in the textile decorations of the Coconut Grove night club in Boston resulted in a blaze that ended the lives of 489 football fans who could not escape. You can still recall vividly how a circus tent, waterproofed with wax dissolved in gasoline, turned into a flaming shroud for 163 people, mostly women and children, in Hartford, Connecticut. These holocausts made every newspaper headline in the country, while less spectacular, but equally deadly are the daily—almost hourly—losses of life from fires in our homes. *Life* recently reported that 4900 people were burned to death last year, although these deaths never make the headlines. This is roughly equal to the number of U S army prisoners who were murdered by the Reds in Korea recently. Of this large number, 212 died from smoking in bed. Yet, draperies can be made durably fire retardent. In fact, today, even cotton mattresses, mattress pads and upholstered furniture can be treated so that they will not burn, so that most of these tragedies are now preventable.

It is human nature to lock the barn after the horse is stolen. All these headline tragedies have led to new laws and city ordinances regulating fire hazards. Public rooms in hotels, theaters, etc, in most large cities must have their textiles treated for flame resistance or lose their liquor licenses—a very effective deterrent. One state, California, has laws prohibiting the sale of fire-hazardous clothing. National legislation for the same purpose has been held off pending the establishment of suitable test methods and commercial standards. Thanks to the work of H E Hager's Committee in our own AATCC, the testing end of this problem has been well taken care of, and the final step is an agreement on what actually constitutes hazardous clothing. The armed services are today's biggest users of fire-retardant textiles, and the Coast Guard now requires that all textiles used by passenger liners be treated. The first completely fireproof American liner will be commissioned next May and make its maiden voyage July 3rd.

However, the subject I should like to emphasize this evening is to tell you what your mills can do technically to produce fireproof textiles and what to do from a sales standpoint to get into this business and to prevent future tragedies.

AVAILABLE FIRE RETARDANTS

There have been, of course, a great variety of chemicals used for making textiles fire retardant. The earliest finishes contained a mixture of borax and boric acid or ammonium salts, etc, which did a good job of fireproofing but often made the cloth tender and yellowed it. They were hygroscopic and subject to dangerous migration. These types of fire-retardant treatments are often called non-durable, water-soluble or renewable. Ammonium sulfamate is an improved version of this type, and American Cyanamid Company has Aerotex Fire Retardant NDC, a combination of water-soluble salts, which overcomes the objections just listed above.

Although these nondurable fire retardants are fairly inexpensive, the cost of retreating textiles each time they are washed or cleaned can soon mount up to quite a sum. This has led hotels, restaurants and other public places to be interested in the economy of a durable treatment. Hence, many chemical companies are offering a durable type, such as DuPont's Erifon, and National Lead's Titanox FR, and American Cyanamid's Pyroset D, DO, etc. I shall not attempt to explain the good and bad features of competitive products but will confine my remarks to Pyroset DO Fire Retardant, an organic phosphate, which seems to react with cellulose to fix 5 to 7% of nitrogen and around 2% of phosphorus on the goods, thus rendering them slow burning. I suppose the reaction is an ester formation with the cellulose; anyhow, this finish is sensitive to strong alkalis and high washing temperatures. Our present product, therefore, cannot be recommended as fast to washing in commercial laundries where ordinarily alkalis and high

* Presented at La Grange, Georgia, before the Southeastern Section on December 8, 1951.

temperatures are employed in washing cottons. In our own plant laundry where we wash welders' and lead burners' coveralls treated with Pyroset DO Fire Retardant, we get up to 32 washings without any loss in fire retardancy, but as a last rinse in our washing formula we use a half-percent solution of ammonium sulfate. I think it should be pointed out that the antimony-titanium type of fire retardants are somewhat sensitive to fluoride sours normally used in public laundries, so that I know of no good fire-retardant treatment at present which can be washed successfully on a commercial scale without precautions.

APPLICATION

To be specific from a mill standpoint, how do we get a good fire-retardant treatment on cotton? Well, in the first place the goods must be thoroughly absorbent; a good kier boil or its equivalent is required. The reason for this is that every fiber in the yarn must be thoroughly treated or a flame igniting the goods will search out a weak spot and the fabric will burn. Next, goods to be treated must be dyed or printed with fast colors. The Pyroset solution is applied on a mangle from a water solution, and, obviously, if direct colors are used and they bleed, there will be a loss of shade in running through the Pyroset bath. Other factors in getting good results are the use of a three-bowl hydraulic mangle with adequate pressure; two nips and two dips obviously give a better result than one each. Care and thoroughness pay off in getting a thorough impregnation just as they would if you were pad-dyeing similar goods.

Perhaps the most exacting part of the procedure is the making up of the Pyroset bath. To do so on the basis of 100 pounds of solution, 30 pounds of Pyroset is stirred into a slurry with about 25 pounds of water at 100°F and 10 pounds of 85% phosphoric is added last. Mechanical stirring is advisable as success lies along the narrow path of having enough heat to dissolve the concentrated salts but not enough to break down the solution and to cause the active evolution of formaldehyde. If the temperature rises above 115°F, more cold water or even cracked ice is added. If it drops below 100°F, Pyroset DO does not readily dissolve. Where greater durability is desired, the addition to the pad bath of 4 to 6 pounds of a melamine resin, such as Aerotex Resin M-3 is recommended. Where greater flexibility and water resistance are needed, one should add a like amount of Permel Resin N, a durable water repellent. Incidentally, the addition of Permel Resin N will not help the spray rating but it will cut down markedly the dynamic absorption.

After the cloth is impregnated on the pad with the above solution, it is dried and made ready for curing of the resin. Curing can be effected in three or four minutes at 300°F. If the curing oven is held at 350°, the time can be shortened and production speeded up accordingly. As the goods at this point are rather stiff and brittle, a loop-type curing oven may give trouble from poor drape of the cloth. A roller type with driven rollers is more suitable, or even specially heated tenter frames. Some plants are using a Sill infrared heating unit as a booster. The cured goods should be rinsed thoroughly, preferably in rope form, to get them soft and pliable and to remove excess catalyst and uncured resin.

There is usually a slight lightening and faint yellowing of the shade from the Pyroset treatment. This change of shade with vats, naphthols, indigosols, and other fast colors is not serious, but it is appreciable where a stylist or color expert is extremely critical. In such cases exact matches can be obtained by overdyeing or over-printing with perhaps 10 or even 25% more color and by a reduction in yellow component, if present. I have samples representing actual production, which illustrate to what extent this may be necessary.

Treated goods should always be tested for fire retardancy. For this you have got to set up special testing equipment, which is fortunately not very expensive. The vertical-strip method advocated by the ASTM and AATCC is the one to use. The height of the burner flame must be regulated most carefully, especially now when the BTU content of the gas in many cities has been raised above the old standard of 550 BTU's per cubic foot because of the use of natural gas. It may be better to employ a standard bottled gas, such as propane. The sample holder itself has been found to be a factor in influencing char length as a large metal holder tends to cool the sample and to give shorter char lengths. Afterglow and afterflaming should be noted as these are particularly important where clothing is involved.

Finally comes the question of merchandising a new finish, such as these fire-retardant finishes. As I have already pointed out, the economic interest of hotels, theatres, night clubs and other public places makes them good prospects for new durable fire retardants. Of course, each city's ordinances will specify exact tests which must be met. In the case of passenger liners, the Coast Guard has its specifications. In the case of tent liners, tentage, or possible combat clothing for the armed forces, definite specifications are always indicated.

But the biggest future field of all, the treatment, with durable fire retardants, of clothing, draperies and upholstery for private use and of mattresses and upholstered furniture for public and private use, is practically untouched. This field, which might well amount to 100 million pounds of cotton annually, must certainly be developed. The public tends to avoid the unpleasant, and people have not yet considered the risk involved in the use of flammable household or clothing items.

An educational job must be done. Just as people have been alerted to the danger of heart disease and cancer and taught to take precautions against these killers, so they must be taught to take precautions against death and destruction by fire. These precautions are now available in the use of durable fire retardants.

TRADE-MARKS

The following names employed in the article above are trade-marks.

AEROTEX, a textile finish.

ERIFON, a durable fire retardant.

PERMEL, a durable water repellent.

PYROSET, a durable fire retardant.

TITANOX, a product containing titanium dioxide.

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Meeting Report—Hudson-Mohawk Section

February 1, 1952
Jack's Restaurant, Albany, N Y

THE initial meeting of the Hudson-Mohawk Section for 1952 was held on February 1 at Jack's Restaurant, Albany, N Y. The speaker for the evening was Bertil A Ryberg, Textile Research Department, Procter and Gamble Company, who discussed "Detergency".

Mr Ryberg's talk was supplemented by a colored motion picture entitled "Leave Less to Luck". The film, prepared by the Laundry Research Department and Photographic Laboratory of Procter and Gamble, is basically an evaluation of surface active agents. It illustrates most of the well known test methods and test equipment used in laboratories concerned with textile problems. Useful features of each test are explained in detail.

At the conclusion of the film, Mr Ryberg conducted an interesting question and answer period.

65 members were present.

Respectfully submitted

WILLIAM A NELSON, *Secretary*

30th Annual Convention
Auxiliaries and Testing Group——

SKIN-IRRITATION TESTS FOR THE TEXTILE INDUSTRY*

LOUIS C BARAIL

INTRODUCTION

DURING the past twenty years a considerable amount of research has been done by dermatologists and biologists to find simple and accurate methods for testing the irritating and sensitizing properties of dyes and finishes when applied to fabrics of all kinds. On the other hand, as these tests are conducted most of the time for manufacturers of chemicals and their users in the textile industry, and as there are thousands of different chemicals and fabrics, it is important that they be as inexpensive as possible, as well as reasonably simple and reproducible.

Prior to the publication of the U S Public Health Service Patch Test on 200 human subjects, the results of the investigations conducted in the past in this country and abroad seemed to bring mostly time-wasting controversies. Its accuracy is now accepted with the usual restrictions by the majority of skin-testing specialists. Among the other methods most discussed and objected to by their prospective users are:

1) the patch test on animals
2) hypodermic injection into animals
3) intradermal injection into man
4) intradermal single injection into animals

THE U S PUBLIC HEALTH SERVICE PATCH TEST——The complexity of the subject is also due to the fact that we are in great need of a quick screening test method. The patch test on human beings, unfortunately, is anything but that. As we stated before, it is reasonably accurate when done on 200 subjects; on the other hand, it is time-consuming and despairingly costly to the average textile manufacturer. Results are not obtained before a minimum period of fourteen days, very often seventeen days.

For these reasons, it is obvious that it can only be applied to a limited number of cases. Its use for screening one or two of 30 or 40 products, for instance, is so prohibitive that it is definitely out of question. Another difficulty, which we have not encountered yet but which has been a handicap to many laboratories, resides in not being able to gather on short notice a group of 200 subjects selected to meet all required specifications with respect to age, class group, sex, and many other conditions very often requested from the testing biologist. It is also necessary to make sure, before starting the test, that all participants will be available on 8 scheduled dates during the performance of the test.

Louis C Barail

This paper is a discussion of the methods used for testing fabrics, dyes, finishes, and other chemicals in the textile industry for the presence of primary skin irritants and cutaneous sensitizers. The methods are compared for accuracy, reproducibility, time required to obtain results, and cost. The author's comments are based on results obtained with these methods on the same fabrics and chemicals for a great many years. Over one thousand textile chemicals were tested per se or on fabrics. The methods described are: Patch Test on human subjects, Patch Test on animals, Hypodermic Injection into animals, Intradermal Injection into man, and Intradermal Single-Injection into animals. The last method has been found to be the best screening method of all. It is simple, accurate, reproducible, rapid, and inexpensive. It can be used for the detection of primary skin irritants and cutaneous sensitizers, and results are obtained in 24 hours. It is recommended that, when the results are negative with the intradermal single injection method on animals, patch tests on human subjects be conducted to confirm the results. The patch test on human subjects being very expensive, the injection test on animals will save textile manufacturers valuable time and money by enabling them to eliminate irritating materials in 24 hours, and to use the patch test on humans only on fabrics which have been found to be nonirritating and nonsensitizing to animals.

COMPARATIVE STUDY OF EXISTING METHODS

We have come to realize, during our long years of experience in the field, that the testing biologist is paradoxically considered at the same time as a bumper and a liaison by both manufacturers or users of chemicals and fabrics, and such government agencies as the U S Public Health Service, the Federal Security Agency, and the Federal Trade Commission. The duty of a testing biologist is twofold:

1) To give the best possible service.
2) To see that the methods used are approved or at least recognized by the proper authorities.

This is the reason why we were personally deeply involved in the investigation of testing methods for the determination of the presence of primary irritants and cutaneous sensitizers in woven and knitted fabrics. Two other leading industries were interested in our work: the plastic and drug industries, and a great many of the tests we are going to describe were made on textiles, plastics, dyes and finishes of all kinds.

We will now describe briefly the methods that have been used, either to replace the U S Public Health Service patch test on 200 human subjects, or to precede it and, therefore, to act as a screening test:

1) The patch test on animals
2) The hypodermic injection into animals
3) The intradermal injection into man (single or multiple injections)
4) The animal intradermal single injection method.

* Presented at the 30th Annual Convention in New York on October 19, 1951.

THE PATCH TEST ON ANIMALS—— In theory, the patch test on animals is the closest thing to the patch test on humans. However, when it comes to practice, it becomes quickly evident that its limitations are such that it cannot under any circumstances replace a patch test on human subjects.

Even as a screening test, it is of little value because of its too numerous imperfections and chances of error. A patch test on animals cannot be conducted for five consecutive 24-hour days. It is practically impossible to maintain a patch in place on a laboratory animal for 8 or 10 hours, as was required by some old Government specifications. On the other hand, a patch test applied on animals for a shorter duration is of no value whatsoever. Consequently, the patch test on animals cannot replace the patch test on humans and is not reliable as a quick screening test.

HYPODERMIC INJECTION ON ANIMALS——Hypodermic injection on animals was quite in favor some twenty years ago. It seems to have been completely abandoned now. During our investigation, we found that its results do not correspond to results obtained with the human patch test. This can be easily explained by the different mode of absorption of the chemical by the two methods. It is definitely surprising that such an unreliable test method could have been in use for so long a time.

INTRADERMAL INJECTION INTO HUMANS——The classical test for allergens in humans is intradermal injection. It consists of one single or of multiple injections conducted intradermally into human subjects. The amount injected is very small, and the length of time necessary to obtain a reaction varies with the concentration of the injected extract.

This method is quite reliable, principally as a screening test. However, it has, among numerous disadvantages, the difficulty of finding subjects who accept participation in the test, and the development of marks which sometimes remain at the site of the injections for long periods of time.

THE ANIMAL INTRADERMAL SINGLE-INJECTION METHOD

PREPARATION OF THE EXTRACTS ——The main feature of the method is the preparation and aseptic injection of sterile extracts. The extracts are always made in an autoclave at a pressure of 15 pounds for 20 minutes. As the best extracts are isotonic, the vehicle of choice is normal physiological saline solution, containing 0.85% of sodium chloride in freshly distilled water. However, when it is known that most of the constituents of a given substance are insoluble in normal physiological saline solution, the compound can be extracted in the autoclave in USP olive oil.

Experience based on several thousands of tests indicates that the concentration of the extract of solid materials should be 5% whenever such materials would normally be patch-tested on human beings in their natural state, for instance, as garments ready to be worn.

Liquid finishes are also extracted in 5% amounts when they can be used in concentrated form for patch testing on human beings by means of impregnated gauze. However, most of the time these liquid compounds are much too irritating to be tested in their natural form or at their normal concentration of use. Consequently, they have to be extracted in much lower concentrations, such as 1%, 0.5% and sometimes even lower.

EXTRACTION —— The fabrics or chemicals are placed in adequate amounts in Erlenmeyer flasks or test tubes, and the vehicle is added to obtain the proper concentration. The flasks or tubes are stopped with nonabsorbent cotton and placed in an autoclave as described before.

AMOUNT OF EXTRACT INJECTED ——The amount of the sterile extract to be aseptically injected is always 0.5 ml, whatever the concentration may be and whether the solvent is normal physiological saline solution or USP olive oil.

SELECTION OF ANIMALS——During this investigation we used at first all kinds of laboratory animals. To cite only a few, we experimented with albino rats and mice, cats, French cavies, American guinea-pigs, chicks, hamsters, and rabbits of many types and breeds. All tests conducted on animals were repeated on human beings, or on animals of the same species. When human beings were used, patches were applied to their skin for various periods of time. When animals were used, either patches were applied, or other injection methods were tried in comparison.

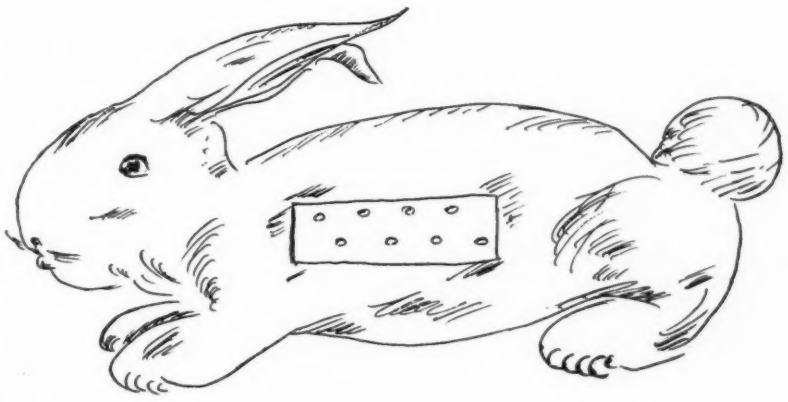
Whenever patches were used on human beings or animals, the tests were conducted in duplicate:

1) with the fabric as is
2) with a 4-ply gauze patch soaked in the same extract as that used for the injection.

No species of animals except the American Chinchilla Rabbit gave results which were confirmed by the patch test on human beings. The American Chinchilla Rabbit is a breed sold by the leading breeders of laboratory animals. It originated in France from cross-breeding the garenne and the blue rabbit. It was brought to the United States in 1919 after several hundreds of generations of thoroughly supervised matings abroad. In these past 30 years, it acquired definite and stable characteristics in this country, and the texture and color of its skin make it the ideal test animal for dermatological tests of all kinds. The animals we use come from pedigreed chinchilla rabbits supplied to us many years ago. They are all descendents of animals from the same two original litters.

SITE OF THE INJECTION——The best spot for the intradermal injection in the rabbit is the side of the animal, and the choice area is a zone located two inches at the right or the left of the spine, parallel to it, 2 to 3 inches wide, and ending 3 to 4 inches away from the neck and tail. Six to eight injections can easily be made in this area (see illustration).

TECHNIQUE OF THE INJECTION ——It is advisable to space the injections about one or one and a quarter inches apart, in order not to confuse the results by too great a proximity of the various solu-



tions tested. Before the injection is made, the freshly shaved and scratchless skin of the animal is gently washed with 70% ethyl alcohol. The needle is then introduced *into the skin* below only a few layers of skin tissue, and the injection is made very slowly. The best results are obtained with needles especially made for intradermal injections, the bevel of which is very short and has a proper slant. Dental needles can also be used for this purpose, but under no circumstances should beginners use hypodermic needles for this purpose.

A standard amount of 0.5 ml is always injected; it never varies. Only the concentration of the extract is subject to variations. During the injection, the external layers of the skin dilate and distend under the slight pressure of the fluid, thus creating a hemispherical blister having approximately the same diameter as a dime.

The injection is absolutely painless, and the elimination of the injected liquid starts immediately after the injection.

INTERPRETATION OF THE RESULTS——The skin of the animal is observed 24 hours after the injection. If the material does not contain primary irritants, no trace of the injection is left on the skin. If on the contrary it does contain primary irritants, the skin shows a reaction which can be evaluated in 5 degrees of intensity.

The condition of the skin is interpreted as follows:

— *No irritation,* indicating that there is absolutely no difference in color between the site of the injection and the surrounding skin.

± *Very slight trace of irritation.* This reaction consists of a tiny spot of a faint pinkish color at the site of the injection. The spot is always much smaller than the area of the injection.

\+ *Slight reaction.* This consists of a pinkness of the skin in an area equal to that of the injection, or a small red spot of a size smaller than that of the injection area.

++ *Definite reaction.* This consists in a red spot of a size equal to that of the area of injection, or a large pink area of a greater size than that of the injection.

+++ *Very definite reaction.* This reaction consists of redness of a large area, with formation of pimples and blisters. This type of irritation is often accompanied by an itch, which causes the animals to scratch themselves and to infect the inflamed area.

++++ *Very definite and spreading reaction.* This is observed when a +++ reaction has been infected by the animals, or when the injected substance was of a very high causticity. It is an actual wound, open and bleeding, where the first layers of the skin have been completely destroyed.

CUTANEOUS SENSITIZATION —— As stated before, the main purpose of the animal intradermal single injection method is to obtain rapid screening results in the determination of the presence of primary irritants. However, if an injection of the same amount of the same material is made on the same animal 10 to 15 days after the first one, it will indicate whether the material is a cutaneous sensitizer or not. The method is particularly useful when the first injection indicates the absence of primary irritants and prior to conducting a patch test on human beings. Such a patch test will definitely be unnecessary if the second injection indicates the presence of cutaneous sensitizers; on the other hand, if the sensitization test is negative, it will be advisable to confirm the results of both tests by conducting a patch test on human beings.

ADVANTAGES OF THE METHOD ——The animal intradermal single-injection method has numerous advantages, which, we believe, make it the number 1 screening method for the testing of primary irritants and cutaneous sensitizers in the textile industry.

1) *It is simple.* No other screening method is easier to apply. Within less than 2 hours any technician of average skill and ability can learn to inject intradermally ½ ml of any extract with aseptic precautions and without causing the slightest pain to the animal or injury to the skin tissue. No further examination of the animal is necessary before the end of the 24-hour period following the injection. This is not the case when patches are applied on animals and have to be verified for adherence, tightness and lack of mobility several times during the day.

2) *It is accurate.* As a matter of fact, it is so accurate that it could very well be used in many cases to replace the patch test on human beings. Hundreds of products tested by the 200-patch test method and the animal intradermal single-injection method gave the same results with both methods. No other screening method was ever able to achieve such results. Consequently, we are of the opinion that no other method is as accurate, *as a screening test,* as the animal intradermal single-injection method.

3. *It is reproducible.* Identical results are always obtained by any number of technicians on the same product and at the same concentration.

4. *It is rapid.* The injection itself is made in less than 30 seconds. The result is obtained at a glance 24 hours later. This is the least time-consuming of all procedures used for the testing of primary irritants.

5. *It is inexpensive.* This is a direct consequence of the simplicity and rapidity of the method. It permits appreciable savings in material, labor and time when compared with the patch test on human beings or any other test method.

CONCLUSION

In conclusion, the advantages of the animal intradermal single-injection method can be enumerated as follows: simplicity, short duration, low cost, accuracy and reproducibility as great as that of the United States Public Health Service patch test. Furthermore, because of its short duration, it is possible to test extracts of various finishes as applied to swatches of the same fabric and to obtain results on all samples tested within one week. Dyes and finishes can also be tested simultaneously at various concentrations and on different types of fabrics. All results are always available at the same time.

We are grateful to the Program Committee for giving us the opportunity to show you the advantages of a method which will be of a very great help in the screen-testing of your fabrics and finishes for the presence of primary skin irritants and cutaneous sensitizers.

DISCUSSION

Question: Is the method applicable to insoluble materials, such as the insoluble finish on a fabric?

Answer: Substances insoluble in water are usually dissolved, if possible, in some other nonirritating solvent, such as olive oil. If a solvent is employed that has not been tested before, also the solvent must be tested alone.

Q: Does the substance under test have to be in solution?

A: Yes, for the animal-injection method.

Q: Can you use a dispersion?

A: Yes, if the dispersion, or suspension, is not too thick to go through the needle readily. One cannot simply use a larger needle because too large particles cause mechanical irritation.

Q: Is a group of 200 people large enough for the patch test when we know that some few people have special allergies? In a group of only 200 such people might be missed.

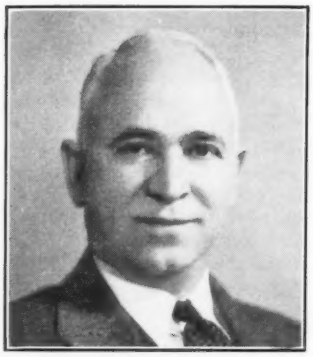
A: The test with 200 subjects is a large-

(Concluded on Page P143)

30th Annual Convention
Auxiliaries and Testing Group——

QUANTITATIVE DATA ON THE ADSORPTION OF A DETERGENT BY COTTON SHEETING UNDER TEXTILE PROCESSING CONDITIONS*

L H FLETT, L F HOYT and J WALTER
National Aniline Division
Allied Chemical & Dye Corporation



Lawrence H Flett

L F Hoyt

J Walter

Synthetic detergents have generally replaced other less active surface-active agents in cotton processing operations, such as kier boiling or open boil off, chlorine or peroxide bleaching, dyeing, washing of naphthol or vat-dye prints and other washing operations. Although it was known that detergents and other surface-active agents were effective because they were adsorbed, it has not been possible until recently to determine the amount actually adsorbed on textile surfaces. Improved analytical procedures capable of assaying minute quantities of anionic detergents has made it possible to study both the amount of Nacconol adsorbed from solution by textile fibers and the factors which govern that adsorption. It has been demonstrated that the adsorption increases rapidly with the increasing concentration up to a concentration of 0.2% on the pure organic basis. Raising the temperature increases the rate of adsorption. For all practical purposes, the adsorption increases with time, but it does appear to reach a maximum for any fiber, which is dependent on the concentration of the detergent in solution. The amount adsorbed from solution varies with the textile fiber; in the case of cotton, the adsorption is relatively low compared with silk and wool. Nevertheless, if processes are run under the most favorable conditions for adsorption, 0.3% of pure organic sulfonate, based on the weight of the cotton, may be adsorbed. Since the amount of detergent used is small and since the weight of the cotton processed is relatively very large, there may be a substantial withdrawal which must be allowed for in calculating economical and efficient operating concentrations. For some purposes it is desirable to have adsorbed detergent that will be effective in subsequent operations where it washes readily from the fibers. Where adsorbed detergent is not desired, processes should be operated to minimize it.

INTRODUCTION

THE PHENOMENON OF ADSORPTION——During the past few years, general interest in detergents and other surface-active agents has lead to the publication of many articles describing the mechanism by which they work. It has been pointed out that, when textile fibers or other products which are insoluble in water are introduced into solutions of surface-active agents, the molecules of the surface-active agent attach themselves to the surfaces of those materials and so bridge the gap between the solution and the normally water-resistant surface. This phenomenon is known to the colloid chemist as adsorption, and it brings about wetting, washing, emulsification, dispersion of solids, foaming and other evidences of surface activity. For example, when a fabric is treated with a dyestuff solution, the surface-active agent brings the solution containing the dyestuff promptly into uniform contact with the textile fibers.

A number of authors have graphically described how the molecules of a surface-active agent line up with the hydrophilic part of the molecule directed towards the water and with the hydrophobic part of the molecule attached to the surface, and how, in the subsequent layers, the molecules align themselves in the opposite direction. Water-insoluble materials, whether they are textile fibers, insoluble dyestuffs, insoluble oils or dirt, are thus made to present an entirely different type of surface to the water solution; and so the surface-active agent makes possible wetting and dispersing effects that could not be obtained with the insoluble materials alone.

TEXTILE PROCESSING——Soaps, soluble oils, and certain protein materials were the first surface-active agents used in textile processing. They had the advantage of low cost, but they introduced many objectionable limitations. Then followed the so-called

* Presented by L H Flett at the 30th Annual Convention in New York, N Y on October 19, 1951.

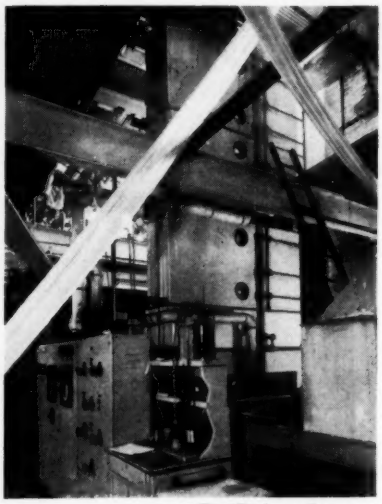
"wetting agents", which did an effective job but which found a very limited use because of high cost and the large amounts required. When the synthetic detergent was developed, it soon started to replace less versatile processing agents; and when it became available at low cost, it came into general use to speed up and improve wet-processing operations. The synthetic detergent found ready acceptability because, in addition to its wetting properties, it had an unusual dispersive action for dirt, oils or solid particles of dyes, and so it served several useful purposes, in contrast to the more limited wetting agents.

As our knowledge of the science of surface-active agents stands today, we know that surface-active agents must be adsorbed by the surface to be effective. It is known that all of the surface-active agent is not adsorbed. The unadsorbed surface-active agent remaining in solution is necessary to maintain an equilibrium with the adsorbed detergent, and it can be very necessary as a protection against dirt, grease or oil which might inadvertently come into the process. Ideally, a very small amount of surface-active agent should be used under conditions favoring a high degree of adsorption.

Up to the present time, there has been no guiding information to indicate what conditions favor the adsorption of surface-active agents. The chemist using the surface-active agents has been forced to work by trial and error. While eminently satisfactory procedures have been worked out by this method, progress has been slow, and the results have been limited to the conditions existing in the particular mill where the studies were made. There have been continual inquiries for directional advice. In many cases, the beneficial use of the surface-active agent has not been attained for want of the time necessary to study its application.

The problem has been even more complicated by the wide range of conditions under which surface-active agents can be used. For example, they may be used over a concentration range of 0.02 to 2.0%, and in extreme cases at concentrations outside of these limits. It is easy to see the possibility of waste where the use of 0.2% may be 10 times what is required, although it is an average amount for most wet operations. Aside from the economic loss from this waste, there is another very important factor. Surface-active agents have been known to give diametrically opposite results, depending on the conditions under which they are used. For example, they are used as foaming agents and as defoaming agents, as penetrating agents and as washing agents, as emulsifying agents and as de-emulsifying agents, and in many other anomalous applications.

Unless detergents are properly used, they may fail to give the desired result, or their use may even prove detrimental. Under these conditions, it is not surprising to hear one mill say that a surface-active agent is worthless, while at the same time another mill benefits from its use. More than one chemist has failed to find detergents useful because he was so anxious to see their effect that he used too much.



The Foxboro Company

Peroxide Bleaching in the J Box Was a Boon to Synthetic Detergents

All of the uncertainty, the limited progress and the discordant results arise from a lack of basic information as to the behavior of the detergent under processing conditions. This knowledge, which could have made possible a better understanding of how to use detergents, has been difficult to obtain.

MEASURING ADSORPTION

METHODS TO ANALYZE SMALL AMOUNTS OF DETERGENT —— The amounts of detergent absorbed are relatively small. It has been possible for some time to show their presence by qualitative tests, but for many years a simple, accurate, quantitative method capable of analyzing minute quantities was not available.

In 1938, Hartley and Runnicles (*1*) described an analytical method based on color changes with bromphenol blue. This analytical method was further improved by Barr, Oliver and Stubbings (*2*), who added chloroform to provide a separate phase where a sharper color end point could be obtained. With these procedures, rapid advances in the knowledge of the adsorption of detergents is being made. The method used in the studies reported below is essentially the method of Barr, Oliver and Stubbings, which is particularly adaptable to the analysis of Nacconol*.

* Trademark "Nacconol" Reg U S Pat Off, Allied Chemical & Dye Corporation.

ESTIMATION OF THE AMOUNT OF ADSORPTION——Given an accurate analytical method, there are several ways in which the adsorption may be determined. In this work with cotton sheeting, it was measured by the reduction in the strength of the detergent solution. That is to say, if detergent is withdrawn from water solution by surfaces, the resulting amount of detergent in solution will be less. The method has been checked by drying and extracting the cotton sheeting after treatment with the detergent solution, and the detergent recovered was found to be equal to the calculated adsorption plus the amount in the solution that was held mechanically by the wet goods.

This method of determining adsorption gives comparatively accurate results at low solution concentrations where 20% of the detergent may be withdrawn from the solution. It is subject to increasing error as the concentration is increased to where only 2% of the detergent may be absorbed. In the latter case, an error of 0.2% in analyzing the amount left in solution would result in an error of 10% in the amount adsorbed.

THESE STUDIES ARE CONCERNED WITH THE EFFECTS OF PRACTICAL CONDITIONS — Studies on the adsorption of detergents by textile fibers have been carried out by King (*3*), Neville and Jeanson (*4*), Aickin (*5*), McLaren (*6*), Swanston and Palmer (*7*), and Fessler (*8*). The further studies reported here have been carried out to develop the behavior of a particular detergent under mill conditions. No attempt has been made to use exhaustive conditions where equilibrium might be established.

The present discussion is limited to cotton, in the processing of which the surface-active agents are playing an increasingly important part.

The first important use of the synthetic detergent for cotton manufacturing was in kier boiling and the open boil off. The use was expanded during the chlorine shortage to increase the chlorine efficiency in bleaching. Its more profitable use in peroxide bleaching naturally followed. For dyeing, it serves to give uniform shades and better penetration, as it does with other fibers. In the relatively short time that detergents have been available, they have found use in all wet-processing operations of the cotton manufacturer, where, in addition to their normal functions, they produce a cleaner cotton either by the removal of undesirable and accidental soil or by the prevention of its deposition on the fibers.

The present study is limited to the detergent, Nacconol NR. While all surface-active agents are adsorbed, the adsorption varies with each different surface-active agent. Although adsorption is necessary for effec-

Adsorption of Nacconol NR by Cotton

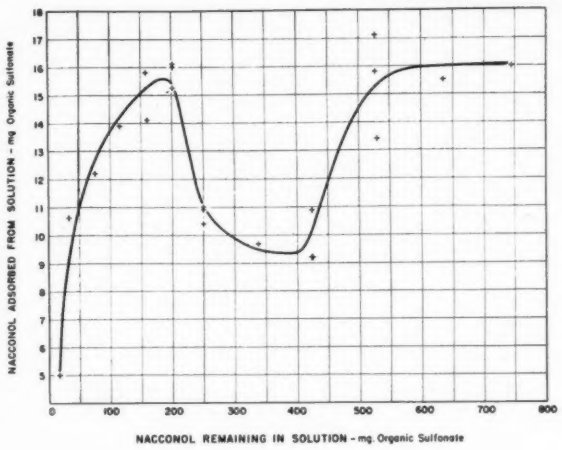


Figure 1
Effect of Concentration

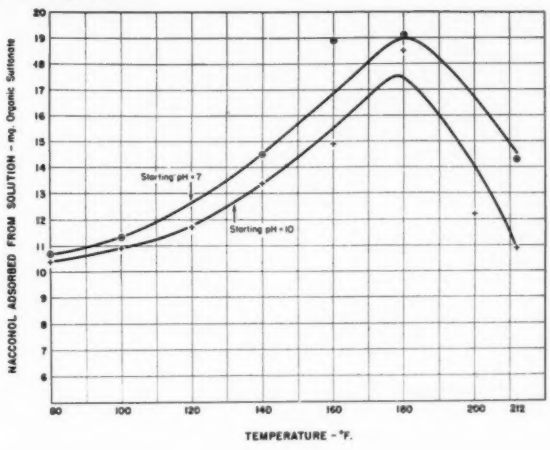


Figure 2
Effect of Temperature

tive application, the relative activity of different surface-active agents cannot be determined by the amount adsorbed. It is also interesting to note that relatively minor changes in structure can bring about a considerable variation in the amount adsorbed.

Unless otherwise specified in the studies which follow, adsorption was carried out for 15 minutes at 120°F with 5 g of unsized cotton sheeting in 100 ml of solution to give a liquor-cotton ratio of 20:1. The quantity of Nacconol is expressed as pure organic sulfonate. The actual Nacconol NR concentration would be about 2.5 times as much.

EFFECT OF CONCENTRATION —— The first condition which is logically considered in the study of the adsorption of surface-active agents is the effect of concentration. This effect in the case of cotton is most unusual. Reference to Figure 1 will show that, while the adsorption is low at low concentrations, nevertheless, it amounts to about 5 mg or 0.1% based on the 5.0 g of cotton when the Nacconol concentration is 20 mg in 100 ml, or 0.02%. In other words, the percent by weight on the cotton is 5 times as high as the percent by weight in solution. However, since the solution-cotton ratio is 20:1, there is still 80% of the original detergent left in solution. The amount of Nacconol withdrawn from solution increases very rapidly, at first, with the increase in the solution concentration. At about 0.1% concentration, the adsorption amounts to over 13 mg, or 0.26% based on weight of fiber (owf). The adsorption continues to increase up to a solution concentration of close to 0.2%, where it reaches a maximum of over 15 mg, or 0.30% owf. At this point, a remarkable thing happens. Small increases in the amount of detergent cut the adsorption nearly in half, and it reaches a second minimum of about 9 mg, or 0.18% in a detergent solution of about 0.4% of pure organic sulfonate; after this it rises again, possibly reaching or exceeding the previous maximum of 0.30% adsorption owf when the solution concentration reaches about 0.6%.

There are means by which the intermediate decline in adsorption can be accelerated or avoided, which indicates that the decline is due to changes in the colloidal state.

The adsorption at such high concentrations is given to show the interesting behavior. Nacconol is rarely used at concentrations above 0.08% pure organic sulfonate (0.2% Nacconol NR), where in this study the adsorption is about 13 mg, or 0.26% owf. This represents a withdrawal of 14% of the Nacconol from solution.

The sodium sulfate used as the builder in Nacconol NR increases its adsorption and its effectiveness. The results given here are with the built detergent, although the data are given in terms of pure organic sulfonate. Salt-free types show much less adsorption at equal concentrations of pure organic sulfonate.

EFFECT OF TEMPERATURE —— The effect of temperature on adsorption is very important. Figure 2 shows the effect of temperature on the adsorption of Nacconol from a solution containing 86.9 mg of pure organic sulfonate in 100 ml of water. The results given are for a 15-minute period, during which time the largest part of the adsorption occurs. At 80°F, where the curve begins, the adsorption amounts to 11 mg, or 0.22% based on the 5.0 g of cotton. This increases rapidly to 19 mg, or 0.38% owf at a temperature of 180°F, after which adsorption declines with equal rapidity up to the boiling point and presumably continues to decline with pressure reactions.

Results are also given to show the effect of a starting alkalinity of pH 10, where cotton is often processed. In this case, the values are slightly lower, but they follow those of the neutral solution (pH 7). The adsorption at the maximum is 1 to 2 mg less in the alkaline solution.

Because of the limiting time, it is not evident whether the early increase in the adsorption with rising temperatures is entirely due to an increase in the rate of adsorption, which might be expected; or whether there has been an increase in the capacity of the cotton to adsorb the detergent. From a practical standpoint, it does not matter.

EFFECT OF pH——Figure 3 shows the effect of pH on the adsorption of Nacconol by cotton sheeting treated 15 minutes at 120°F with a solution containing 86.9 mg in 100 ml of water. The pH values are the initial values which tend to change toward neutral values as adsorption takes place. It will be seen that there is only a small variation in the adsorption above pH 7 up to pH 10, and presumably to pH 13 often used in cotton processing. However, the adsorption increases very rapidly in acid solution. Under the conditions used, the adsorption is about 10 mg, or 0.20% owf, at pH 10. This increases to 11 mg, or 0.22% owf, at a pH of 7; it then increases rapidly to about 25 mg or 0.50% at a pH of 3. At this point, about 30% of the detergent has been withdrawn from the solution by the cotton.

EFFECT OF TIME —— The effect of time on the adsorption of Nacconol by cotton from 100 ml of solution containing 86.9 mg of pure organic sulfonate is shown

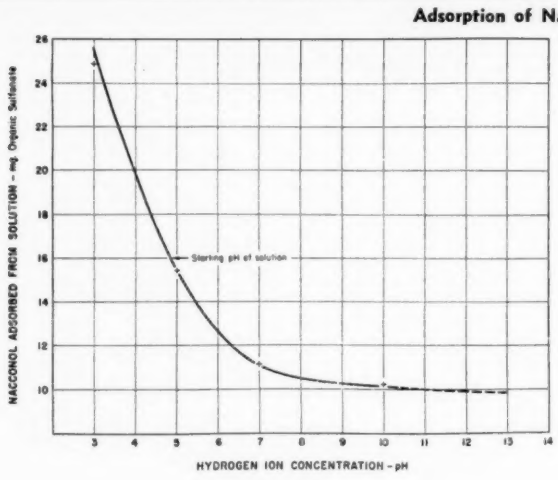

Adsorption of Nacconol NR by Cotton
NACCONOL ADSORBED FROM SOLUTION - mg Organic Sulfonate
Starting pH of solution
HYDROGEN ION CONCENTRATION - pH

Figure 3
Effect of PH

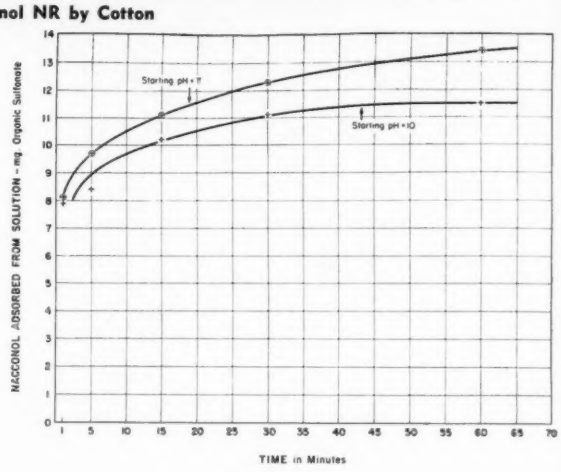


Figure 4
Effect of Time

in Figure 4. After 5 minutes in neutral solution of pH 7, there is an adsorption of close to 10 mg, or about 0.20% owf. By 30 minutes, this increases to about 12.5 mg, or 0.25%, and it still has not leveled off at 1 hour where it is 13.5 mg, or 0.27% owf. At a pH of 10, the adsorption follows the general pattern of the adsorption in a neutral solution, but it seems to level out at about 11 mg, or 0.22% owf.

DETERGENTS BEHAVE LIKE FUGITIVE DYES —— The use of a synthetic detergent may be likened to the use of a fugitive dyestuff. The fabric takes the detergent from solution at a rate which is increased by warming, by increasing the concentration, by increasing the time and by the addition of salt, just as would be the case with a dyestuff. Like fugitive dyestuffs, the greater part of the detergent washes quickly away in fresh water, but traces remain persistently behind.

The behavior of detergents has very important economic implications where their industrial use is concerned. If the synthetic detergent is used only in one operation, such as wetting, washing or bleaching, where it is to serve its brief purpose as quickly and as completely as possible, the minimum possible amount should be used under conditions that favor the most rapid and complete adsorption from solution.

In some processes it is desirable to have the adsorbed detergent retained by the goods. The retained detergent may be desired because it is unfavorable to the growth of bacteria and mold; or it may be advantageous to have the adsorbed detergent carried over from one operation to another so that it may be immediately available to improve the following operation. In such processes a high degree of adsorption is very important, and care must be taken not to desorb the detergent.

In contrast to the operations where a high degree of adsorption is required, there are other operations, such as those in continuous processing, where a high degree of adsorption is undesirable because the detergent would be rapidly exhausted by the cotton and so could not remain effective throughout the processing operation. In such processes it is important to use conditions that minimize the adsorption of the detergent by the fabric.

The use of surface-active agents follows such a varied pattern that an understanding of their behavior is essential to their proper use. The planning of a textile process where detergents are to be used to expedite the process or to improve the result makes necessary a clear understanding of the effect that is desired and a complete knowledge of the factors governing the adsorption of the detergent which leads to that effect.

From the results of these preliminary studies, it is possible to understand many of the anomalies in the behavior of detergents and to lay groundwork for further studies in this intriguing corner of the broad field of surface chemistry.

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(6) McLaren, K, *ibid 66*, 521 (1950).
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DISCUSSION

Question: I am puzzled by the plotting of your data since the quantity on the vertical axis represents the detergent adsorbed by the fabric, whereas the amount on the horizontal axis seems to indicate the amount left in solution. Why did you not elect to plot the initial concentration on the horizontal axis?

Answer: We like to think that this adsorption is a well-ordered state of affairs, and while we have not presented the data, it does seem that there is what might be regarded as an equilibrium between the amount absorbed and the amount in solution. I would be very much surpised if, after the figures were accurately determined, the concentration of the detergent in the fiber, divided by the concentration of the detergent in solution, does not become a constant for any set of conditions; and, if that is so, then we are not concerned with how much we started with, we are concerned with the concentration of the solution in the fiber. That also presents an interesting mixture. At a low concentration you may have five times the concentration on the fiber that you have in the solution.

Question: Are you able to reproduce your data?

Answer: As you could see from the curves, the proportion of total detergent that is adsorbed is far greater at low concentrations than at high concentrations. And since the amount adsorbed is determined by difference, it is true that the percentage accuracy is greater at low concentrations of detergent. I would say that within the useful range of use of the detergent, the accuracy in the amount absorbed is 1 or 2% of the value presented.

Question: What is the effect of salt on

adsorption?

Answer: As one might expect, salt increases the amount of detergent adsorbed on the cotton fiber. In our experiments the salt present was that from the sodium sulfate contained in standardized Nacconol NR, or 60% of the weight of Nacconol NR.

Question: In the first part of your paper you said that 15 minutes was allowed to elapse before withdrawal of a sample in the determination of the data for Figure 1 but that an hour (Figure 4) is required for the attainment of actual equilibrium. In the curve of Figure 2 showing the effect of temperature on equilibrium, did you also use 15 minutes? As equilibrium are more quickly reached at higher temperatures is it not true that in the temperature curve the lower values would be higher and the curve flatter if the values represented truly equilibrium values?

Answer: We used 15 minutes in the work to save time and because we thought the curves would still represent behavior and trends even though equilibrium values were not employed.

Question: Can you explain the pH effect observed in Figure 3?

Answer: I think that change of pH has little effect on the activity of cotton but rather changes the micellar equilibrium. I think, for example, that the sudden drop of the curve in Figure 1 is not due to a chemical change but to a change in the sizes of the micelles. We know that the point at which the drop takes place can be changed by the addition of solvents; and solvents are said to change micellar equilibria.

Skin-Irritation Tests——

(Concluded from Page P138)

scale-screening test and is not really a large-scale test. On the other hand, since it is customary to allow 2% of subjects with a single-plus irritation, we might allow 4 or 5 subjects in 200 to show an irritation of + without condemning the product under test.

By the rabbit-injection method, on the other hand, human allergies do not come into question. If there are many + reactions with rabbits, there is great certainty that the reaction of people will also be positive to the same extent. We then have here an excellent screening test. It is very unlikely that humans by the patch test method can be less sensitive than rabbits by the single-injection method.

But now, if the single-injection method with rabbits gives a negative result, we advise clients to verify the findings with a patch test on humans.

Because of occasional allergies in the case of humans that might not be disclosed by a test with 200 subjects, the Public Health Service recommends that a product, such as a cosmetic, be tried in practical use with perhaps 5000 people before it is concluded that it can not be irritative to anyone.

We are talking here, however, about primary irritants rather than occasional allergens. The single-injection method therefore is more reliable than you might at first think.

If a substance is a primary irritant, it does not take any human subjects to prove the fact from the patch test, as for example, kerosene, which is a strong primary irritant. Kerosene can be used in certain solutions without apparent effect. But if a sensitizing material is present in small quantitities, it may require several applications on human skin before the sensitizing action is brought about.

It's the finished product that is important as far as eliciting a sensitizing reaction that is important. The amount of chemical that can be placed on the fabric that produces primary irritation can be determined in the same way. Therefore, if you know the primary irritant range of the material, you know how much can be put on the fabric, then the finished fabric must be tested because there may be an added effect between the two materials which may either increase or decrease the primary irritant range.

—♦ ♦—

Council Meeting——

(Concluded from Page 131)

M E Jungerman
A H Leonard
Y P Leregle
J E Livak
L L MaDaris
F G Maisch, Jr
T A Martin
H H Marty
A F Mayer
C W Meyers
G E Moos
T H Morton
A Motamedi
W P Munro
S Murow
J B Neel
R I Parker
W F Parsons
W F Piekarski
R B Porter, Jr
J Pulichino
R C Ramsay
J P Reeves
J F Regan
A Renold
C A Riley
H B Risher
C E Rollins
W Rooks
S Rotevant
P M Salaff
J E Sanders
W J Schwab
F Sevean, Jr
J M Senesac
E Sewell
N C Simcoe
S Simon
J J Smith
J K Smith
P J Smith
M R Stevinson
R G Stoll
C S Torp
J Tripido
C H Vance
E B Voltolini
E D Weersing
L M Wise
F E Woodward
W D Worth
M S Yoshinari
C W Young
R Zoccolillo

JUNIOR

F M Axelrod
J Balloch, Jr.
H H Bander
T P Innes
J W Kirk
P E Loos
S Maiolo
C H Mueller
P P Pritulsky
L Ricard
P R Schwaegerle
G F Sirine
H F Tindel
J J White
T A Wise
J M Zambo

ASSOCIATE

H D Andrade Lima
O Bizioli
L J Brady
E J Britton
D S Corliss
J L Costa
W A Dickinson, Jr
H Evans
P L Flanigan
D Feuer
K F Glass
R Hanson
J S Houghton
M B Hundert
L B Hunt
M Kaplan
D Kinni
G Koechlin
R J Martin
P Martell
T L Mayer
S P Miller
T Oakes
A G Rocha
J M Scanlon
V C Smith
S C Soneson
J F Steimle
H B Walker

STUDENT

J R Belche, Jr
G Blouin
B C Boudreault
R H Brehm III
T J Calnan
D D Carmichael
J Carvalho, Jr
J Cohen
J E Cunningham
E A Dalmas
B B Drawhorn
R Dumas
M Eichenblatt
G Filion
T F Garvey
P A Girouard
M E Goldberg
W Gonet
W L Hamiter
F A Hoffman
G H Jones
M Kallman
R P Kirchner
P A Lamoureux
P F Lanthier
R W Legge
J H Lockamy, Jr
L C Marrone
A Mayer
A W McConnell
E J McNamara, Jr
W L Miller
H P Nantel
J R Nosal
O J Palma
V G Paul
S A Peltekian
G L Rota
G E Saba
J J Schrier
J G St Germain
J W Swiggett
R A Tougas
W W Wieland

Transferred from other classifications to Senior membership were

M Fishman
R Jaramillo
J L Johnson
G Loeb
C Mackenzie
J M McChesney, Jr
P F Riordan
G W Spicer
A E Tamosauskas
J D Williams

Respectfully submitted,
H C CHAPIN, *Secretary.*

30th Annual Convention
Finishing Group——

TEXTILE APPLICATION OF BRIGHTENERS*

OPAL L SHERBURNE
Antara Products Division
General Dyestuff Corp

and

JOHN P G BEISWANGER
Central Research Laboratory
General Aniline & Film Corp

Opal L Sherburne

The use of brightening agents in whitening partially bleached muslin during soaping and during peroxide bleaching is discussed along with their use in whitening the background of printed material. Reference is made to the use of brightening agents in whitening bleached wool and in the brightening of baby-blue and baby-pink wool dyeings.

An instrumental method is presented for the evaluation of brighteners when used in bleaching and soaping operations on muslin. This method is an extension of work previously presented, which described the evaluation of brighteners used in the soap industry. Reference is made to previous presentations of the physical background upon which the method is based with an abbreviated discussion of the factors involved and instrumentation used. The technique involves measurement, under controlled conditions, of the fluorescent brightness when brightening agents have been applied to a substrate. Thus from these measurements one can evaluate under use conditions the strength ratios of brighteners, their comparative dollar value, and their stability to such materials as bleaching agents.

INTRODUCTION

WITHIN the past five years the use of fluorescent optical whitening agents in the soap and textile industries has assumed sizable proportions by virtue of their property of making near-white textiles appear whiter. As a consequence there have appeared numerous publications *(1, 2, 3, 4, 5, 6, 7, & 8)* directed toward a still wider use of such compounds through explanation of the phenomena involved and the suggestion of areas of application. The bulk of the literature in this field has dealt with the physics of the phenomena per se and the chemical configurations of compounds responsible for brightening properties. To a lesser degree, the varied applications of brighteners in the textile field have been cited; the most recent of which is that given by Caspar *(9)*.

While a discussion of these aspects of the brightener problem has served a valuable purpose insofar as they have extended the popularity and intelligent use of these materials, it is the opinion of the authors that a wider and more enthusiastic use of brightener products would result if a non-subjective and relatively simple instrumental means of brightener evaluation were available.

Methods of evaluation may be divided broadly into visual and instrumental approaches. The problem of visual evaluation is complicated by the fact that colorists are not trained to evaluate changes in whiteness but to look for changes in hue, and the eye is more sensitive to changes in hue than it is to changes in lightness. The accuracy and reproducibility of the visual method are unknown, the significance of the results has not been established, and criteria for judgment have not been set up. Instrumental methods of evaluation have been investigated and their accuracy and reliability established.

The colorimetry of fluorescent whitening agents has been discussed in a paper by Hemmendinger and Libhart *(10)*, and on the basis of this work Beiswanger and Hemmendinger *(11)* developed methods for the evaluation of brightening agents

John P G Beiswanger

used by the soap industry. It is pointed out in this second paper that related methods of testing could be developed for applications differing from those used in the soap industry. This paper presents some of these extensions. Since the previous papers established the basis for the physical measurements used in brightener evaluation, it will suffice to outline here only the basic quantities that can be conveniently measured and to show how the values derived from these measurements can be used (1) in deriving strength ratios between various brightening agents used to whiten the background in printed materials and to improve the whiteness of bleached muslin, (2) in determining the stability of brighteners to bleaching agents, and *(3)* in establishing dollar comparisons of various products offered for use in these applications.

BRIGHTENER PHOTOMETRY —— Brightening agents are fluorescent compounds that absorb ultraviolet radiation and emit visible light when they are applied to a substrate. Compounds offered for use must be so chosen that the color of their emission (blue) will neutralize the yellow which is common to off-white materials. It would be desirable to measure the over-all whitening effect produced by the use of these fluorescent compounds, but adequate instrumentation is not at

* Presented before the Finishing Group by Opal L. Sherburne in New York on October 19, 1951.

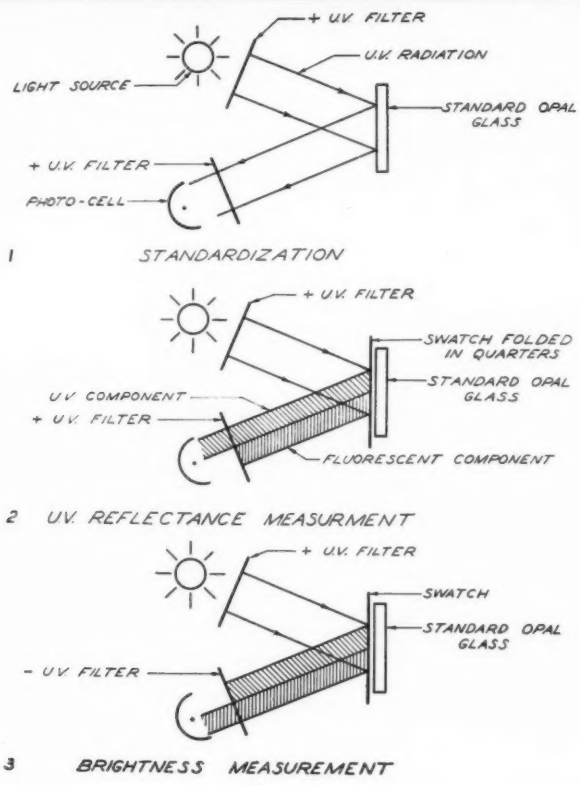

Figure 1
Brightener Photometry

hand to do this in a simple fashion. *One must therefore rely upon visual observation to judge this over-all effect.*

Since it has been shown *(10)* that satisfactory brighteners are very similar in their colorimetric properties, recourse may be had to abbreviated photometric methods, which measure the efficiency with which various compounds produce the fluorescent emission that causes the whitening effect. This may be done as illustrated in Figure 1. When ultraviolet radiation from a filtered source strikes a brightener-treated swatch, part of the radiation is reflected and part absorbed. The greater portion of the absorbed radiation is re-emitted as visible fluorescence. If a photocell covered with a filter which passes only ultraviolet radiation is placed in the path of the reflected and emitted light, it will "see" only the reflected ultraviolet and hence measure the ultraviolet reflectance (Diagram 2 of Figure 1). If the filter is now replaced with one which excludes ultraviolet but passes visible radiation, the brightness of the fluorescent emission can be measured (Diagram 3). The measurements can be standardized by adjusting the response of the photocell to a standard opal glass plate (Diagram 1). An instrument based on these principles was constructed at our Easton Laboratory for less than the price of a Launder-Ometer.

The fluorescent brightness measured in this manner is a function of the concentration of active ingredient on the cloth. A study of a concentration series will therefore enable one to make strength comparisons of various samples under the most desirable condition, that is, when applied to the fabric. Any treatment which may be deleterious to the brightener, such as treatment with bleaching agents, will be accompanied by a loss in brightness if the brightener is decomposed. It is therefore possible to follow such treatments quantitatively by measurement of fluorescent brightness. The ultraviolet reflectance data may also be used to estimate the quantity of brightener on a swatch, but this aspect will not be discussed further here.

The previously reported work was concerned solely with the application of brighteners in the presence of soap as used in home laundry practice and, in addition, described the effect of a hypochlorite rinse on brightener stability.

The present paper extends this work to textile applications in the absence of soap and in the presence of bleaching materials.

WHITENING MUSLIN

WHITENING MUSLIN DURING SOAPING —— Muslin swatches were bleached in a peroxide bleach liquor containing eight pounds of 100-vol hydrogen peroxide and 10 pounds of sodium silicate per 100 gallons of liquor. The bleaching was done in the Launder-Ometer at 180°F. One-half of the group of swatches was partially bleached for one-half hour, while the remaining half was given a full bleach of one hour. After bleaching, the swatches were rinsed, soured, rinsed and neutralized.

The above bleached swatches were then soaped in the presence of two brightener samples at various concentrations as follows:

Two five-gram swatches were washed for 30 minutes at 180°F in a Launder-Ometer with a cloth-to-liquor ratio of 1:20. The liquor contained 0.4 per cent unbrightened built detergent and 0.02, 0.04, 0.06, 0.10, and 0.20 per cent brightener, based on the weight of detergent. The swatches were rinsed three times in lukewarm tap water, and one swatch was hung up to dry in an air cabinet at about 150°F. The other swatch was subjected to a 30-minute Clorox rinse (in the Launder-Ometer at 180°F) in a liquor containing 4 ml Clorox per liter (liquor ratio: 1:20). After the Clorox rinse, the swatches were rinsed in tap water and air-dried at about 150°F.

Visual examination of the soaped swatches showed that material which had been bleached only one-half hour was whiter when soaped in the presence of brightener than material which had been bleached for one hour, but soaped without brightener.

The brightness of all samples was then measured and the data plotted in Figures 2 and 3.

Brightener sample 2 gives a brightness of 23 at 0.06 per cent brightener (relative to soap) when applied to muslin which had been bleached one hour, while it required only 0.035 per cent of brightener sample 1 to give the same brightness. This gives a strength ratio of 58:100 between the two samples. The strength ratio is the same, within experimental error, for the one-half hour bleach. A dollar comparison of the two samples may be made by use of the simple relation

$$B/\$ = \frac{\text{Standard brightness}}{P \times C}$$

where "P" is the price per pound and "C" is the concentration required to produce a chosen standard brightness and "B/$" is the brightness per dollar. In this case the samples will have an equivalent dollar value if sample 1 sells for $1.00 per

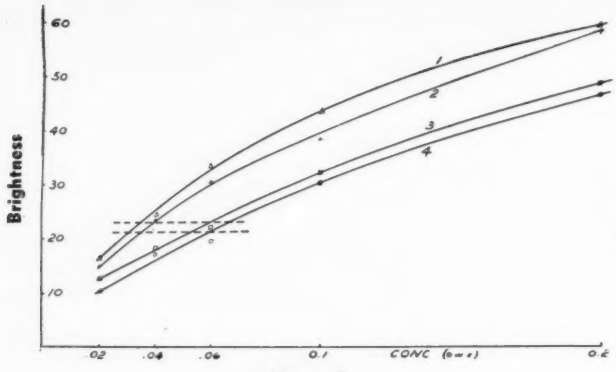

Figure 2

Photometric Curves
Whitening of Partially Bleached Muslin
Brightener Added During Soaping
(Without Clorox Rinse)

1—Sample 1, Swatch Prebleached 1 hour
2—Sample 1, Swatch Prebleached ½ hour
3—Sample 2, Swatch Prebleached 1 hour
4—Sample 2, Swatch Prebleached ½ hour

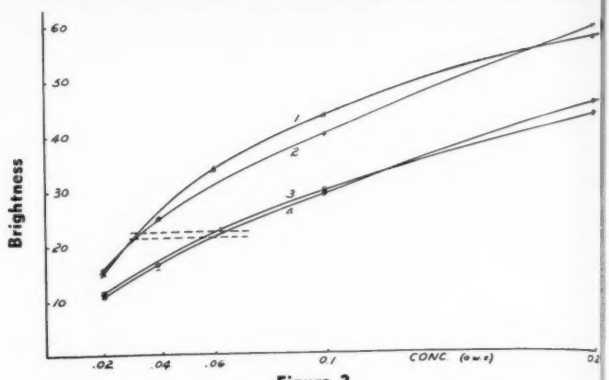

Figure 3

Photometric Curves
Whitening of Partially Bleached Muslin
Brightener Added During Soaping
(With Clorox Rinse)

1—Sample 1, Swatch Prebleached 1 hour
2—Sample 1, Swatch Prebleached ½ hour
3—Sample 2, Swatch Prebleached 1 hour
4—Sample 2, Swatch Prebleached ½ hour

pound and sample 2 sells for $0.58 per pound.

After Clorox rinse the brightness at 0.06 per cent sample 2 is only slightly less than before Clorox rinse, but sample 1 shows a better stability to Clorox in that its strength ratio at 0.06 per cent is 52:100 with brightener sample 2.

WHITENING OF SHEETING DURING PEROXIDE BLEACH——Swatches of unbleached muslin sheeting were bleached for various lengths of time under controlled conditions with and without brightener. The swatches bleached with brightener present in the bleach liquor were compared with a standard bleach and with a commercially bleached sample of the same muslin. In all cases swatches bleached in the presence of brightener for a shorter length of time than standard (without brightener) were whiter than both the standard and the commercially bleached product. In addition, the brightening agents showed excellent stability to the bleach liquor, and the distribution of brightener on the cloth was exceptionally level. Two different brightening agents were used for the tests, and in both cases a fifteen-minute bleach with 0.001% (by volume) of brightener in the liquor produced a whiter fabric than a one-hour bleach without brightener.

The bleaching was carried out under the following conditions in the Launder-Ometer:

SOLUTION

	g per ml
Sodium Silicate	0.0960
Hydrogen Peroxide, 30%	0.0764
Brightener	0.001

The Launder-Ometer jars were charged with

25 ml sodium silicate solution
25 ml hydrogen peroxide solution
2 ml brightener solution and
148 ml distilled water

The jars were then preheated to 170°F, two 5-gram swatches of unbleached sheeting were added when the liquor was on temperature, and the jars were closed and put into the Launder-Ometer. Blanks were also run without brightener. Specified swatches were withdrawn at fifteen, thirty, forty-five, and sixty minutes. The blanks were bleached for sixty minutes.

The ultraviolet reflectance and fluorescent brightness of the samples were measured and tabulated in Table I. The lower section of the table presents data on swatches which are duplicates of the upper section. These data show reasonable agreement between the two runs. The brightness values show an increase in brightness with increasing length of bleach time. The reflectance values show a decrease in the amount of ultraviolet ladiation absorbed with increasing bleach time. These two facts indicate that very little of the brightener is destroyed during the bleaching process and that the fluorescence is produced more efficiently as the bleaching progresses.

A concentration series was also run using 0.000333, 0.000666, 0.0010, and 0.00166 per cent (based on volume of liquor) of brightener. One set of swatches was bleached for thirty minutes with samples 1 and 2. Another set was bleached for sixty minutes with the same samples. Brightness readings were taken and the data were plotted in Figure 4. Strength ratios and dollar values can be computed from these curves as shown in previous discussion.

WHITENING OF PRINT BACKGROUND DURING SOAPING——Three vat dyes (a brown, yellow and blue) were

TABLE I

FLUORESCENT BRIGHTNESS AND ULTRAVIOLET REFLECTANCE OF SWATCHES WHITENED IN THE PRESENCE OF PEROXIDE BLEACH

0.001% BRIGHTENER

Bleach Time Min	Sample 2 B %	Sample 2 R %	Sample 1 B %	Sample 1 R %
15	64.8	55.2	79.8	50.8
30	74.5	56.1	87.7	49.0
45	79.4	56.5	90.3	51.9
60	78.1	57.0	95.5	51.9
60	78.3	57.3	91.1	54.4
15	68.4	50.8	86.5	48.3
30	80.7	51.5	92.7	49.7
45	78.2	53.0	95.1	51.0
60	84.8	54.1	93.0	51.1
60	80.4	56.3	95.8	53.2
60	No Brightener		4.5	91.1

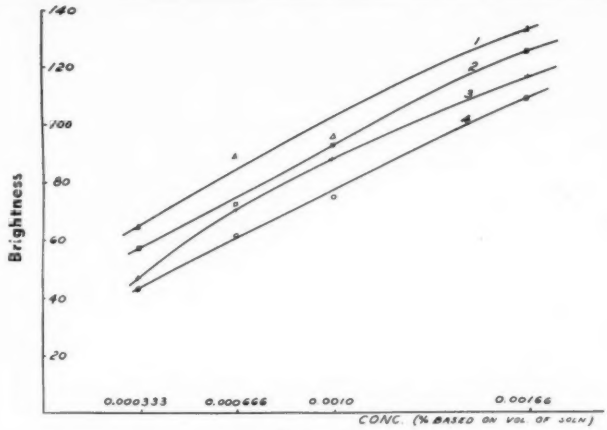

Figure 4

Photometric Curves
Whitening of Unbleached Sheeting During Peroxide Bleach

1—Sample 1, Bleached 1 hour
2—Sample 1, Bleached ½ hour
3—Sample 2, Bleached 1 hour
4—Sample 2, Bleached ½ hour

printed, vat-aged five minutes, oxidized, rinsed in cold water and dried. One Rapidogen (a blue) was printed, acid-aged four minutes and dried without soaping. Swatches of these print materials were then subjected to soaping under controlled conditions in the presence of varying concentrations of brightening agents as previously described. The swatches soaped with brightener were all compared visually with a swatch of the same material which had been soaped in the same fashion but without any brightener. Those swatches that had been treated with brightener showed whiter backgrounds than the swatches that were soaped in the absence of brightener.

The fluorescent brightness of the treated swatches was measured and plotted as a function of concentration, Figure 5. The data show that the brightness is a curvilinear function of the concentration of brightener and approaches a maximum at high concentrations. This is to be expected since it is reasonable to suppose that the cloth will become saturated with brightener. The data also indicate that the background of cloth dyed with the Rapidogen brightens more readily than the vat-dye background.

In another test, the brown and blue vat dyes were treated as described above with brightening agents of different strength. The data are plotted in Figure 6. Brightener sample 1 gives a brightness on the blue-dyed cloth background of eighteen at 0.04 per cent (brightener relative to soap), while it requires 0.10 per cent of brightener sample 2 to produce this same brightness on the blue-dyed cloth. Sample 1 is therefore 40:100 with respect to sample 2 for this application. Strength relationships between samples may be established for each type of application in this manner. Care must be exercised to insure that samples are compared on the same substrate and under the same conditions of application, as the performance of a brightener is conditioned by the color and physical condition of the material to which it is applied.

WHITENING AND BRIGHTENING WOOL

Instrumental evaluation of brighteners applied to wool has been carried out only along exploratory lines in our laboratories. However, visual evaluation was made in the following sets of experiments.

A sample of unbleached wool was treated with 0.1 per cent brightener (on weight of fabric) and this sample was whiter than a sample of the same material that had been bleached with peroxide. A sample of the peroxide-bleached wool was treated with 0.1 per cent brightener, and this material was the whitest wool that we have ever seen. Sample skeins which had been dyed with baby pink and baby blue were given an after treatment with bright-

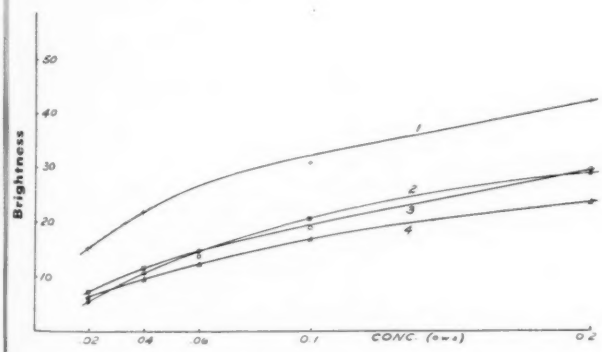

Figure 5

Photometric Curves
Whitening of Prints During Soaping

1—Rapidogen Blue
2—Vat Blue
3—Vat Brown
4—Vat Yellow

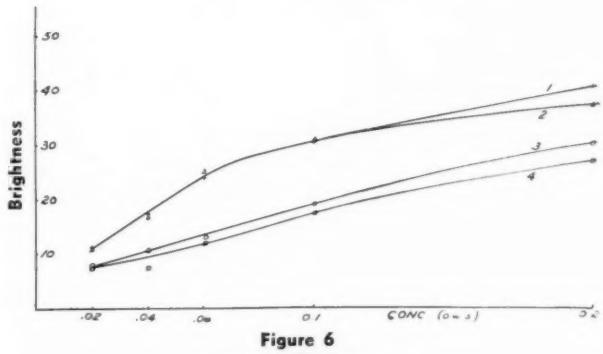

Figure 6

Photometric Curves
Strength Relationship Between Brighteners
Whitening of Print Background During Soaping

1—Vat Blue, Sample 1
2—Vat Brown, Sample 1
3—Vat Blue, Sample 2
4—Vat Brown, Sample 2

ening agent. A great improvement was noted in the brilliance of these shades.

While the major portion of work to date has been on cellulosic fibers, the highly favorable results obtained by applying brighteners to wool would seem to warrant extension of this evaluation technique to animal and possibly synthetic fibers.

SUMMARY

This paper has presented an extension of instrumental evaluation methods developed for brighteners used in the soap industry to the evaluation of brighteners used in the textile industry. The applications considered are as follows: 1) to whiten the background of printed materials, 2) to whiten partially bleached muslin during soaping, and 3) to whiten muslin during peroxide bleaching.

The writers wish to acknowledge the assistance of Shirley V Ashcroft, Concetta T Scalia, and Richard G Lippincott in preparing the experimental data. They also wish to thank Eric Channon, C F Jelinek and R L Mayhew for their aid in reviewing the paper.

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(11) Beiswanger, J P G and Hemmendinger, H. Presented at the Chicago meeting of the Chemical Specialties Manufacturers Association, April, 1951.

DISCUSSION

Question: Your figures on quantities were mostly based on bath volumes, whereas people in the mill are more interested in owf figures.

Answer: In continuous operations, concentrations must be based on weight of solution. In our experiments carried out in the Launder-Ometer, the cloth-to-liquor ratio was 1:20, from which quantities can be readily figured either on weight of fiber or on weight of solution.

Q: Does your brightener, when employed in soaping baths for prints, have any effect on the fastness of vat or Rapidogen prints? We have found that many brighteners are very fugitive; they even turn brown on exposure.

A: The early brighteners were indeed bad in that respect. Present successful brighteners behave much better; they are faster and they do not turn brown. The important thing is that prints look bright on the counter. The brightener will later be washed out in home washing unless the soap used in the home contains a brightener. As a matter of fact, most successful home laundry soaps do now contain brighteners.

Q: It has been said that brighteners increase the over-all brightness of a fabric very little, but they do increase noticeably the apparent reflection of blue or violet light from a fabric. They therefore make a yellowish fabric appear whiter because the blue neutralizes the yellow. But brighteners vary considerably in hue from red-violet to greenish-blue. And how about brighteners that are essentially white? Can they all be evaluated in money value by a single measurement at 470 millimicrons?

A: Successful brighteners on the market are narrower in the range of their hues than might be thought from the remarks of the questioner. They all display essentially a violet or blue color and can be quite well evaluated by a reading at about 470 millimicrons.

Q: Does the yellowish light of an incandescent bulb activate a brightener?

A: No, because it contains so little ultraviolet. You should know, however, that a slight yellowness in a fabric is not so evident in a yellowish light. A full bleach therefore looks hardly whiter in artificial light than a three-quarter bleach. If a material with a three-quarter bleach contains a brightener, it may therefore look as white as a full bleach in either daylight or artificial light.

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

52-5

Education: B S, Chemistry, Mass Inst of Tech.

Experience: research engineer in charge of Technical Service Dept for large worsted manufacturing plant, now shutting down.

Age: 54; married; references from present employers and others; north Atlantic coast preferred. 2-18, 3-3

52-6

Education: B S, Chemistry, Mass Inst of Tech.

Experience: chemist of large worsted manufacturing company now in process of liquidation; formerly Major in charge of chemical company, U S Army; salesman for textile oils.

Age: 48; single with one dependent; references; location immaterial. 2-18, 3-3

52-7

Education: high school and evening textile school.

Experience: general overseer of finishing, worsteds, woolens, synthetics and blends.

Age: 52; married; references; northeastern U S preferred. 2-18, 3-3

52-8

Education: textile evening, plus university courses in factory management and quality control.

Experience: Superintendent, woolen and worsted cloth manufacturing.

Age: 37; married; references; north Atlantic coast preferred. 3-3, 3-17

52-9

Education: B T C, Lowell Textile Institute.

Experience: Textile chemist, worsted and woolen mills.

Age: 58; married; references; New England preferred. 3-3, 3-17

Forty members and guests met at the Nikabob Cafe, Los Angeles, Ca', for the January 11th meeting of the Pacific Southwest Section. (See report on page P116, Feb 18th issue.)

Meeting Report—— Western New England Section

January 25, 1952

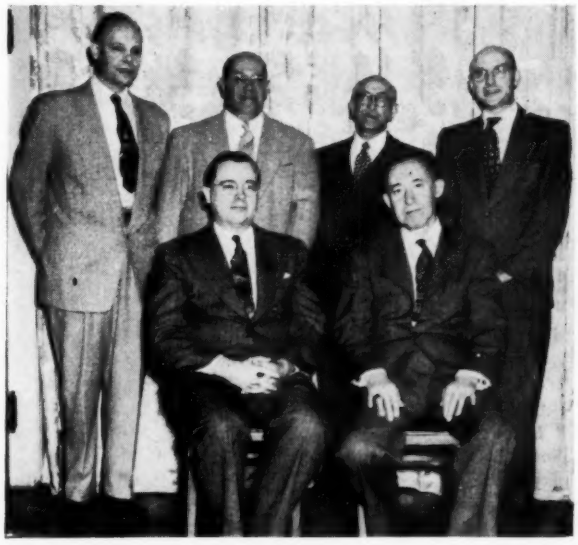
Rapp's Restaurant, Shelton, Conn

A MEETING of the Western New England Section was held on January 25, 1952 at Rapp's Restaurant, Shelton, Conn. Sixty-two members and guests were present to hear Herman P Baumann, United Piece Dye Works, speak on "Some Problems in Handling the New Synthetics". Mr Baumann's talk was devoted mainly to a discussion of the dyeing procedures being used on the various synthetics and he also described techniques which have been used successfully in printing these fibers. Of particular interest was a fiber staining procedure he described for identifying synthetic fibers, which provides a means for differentiating the various commercially available new fibers.

Chairman R C Geering announced the following list of committee chairmen:

Nominating—O Edelstein
Outing—J F Melody
Program and Arrangements—J E Lynn
Auditing—R R Pezet
Research—J B Dick
Property—A F DeMarco
Corporate Membership—J E Lynn
Publicity—A N Henschel
Membership—N J Glade

Respectfully submitted,
A S NYQUIST, *Secretary*



Officers and Committee Chairmen of the Western New England Section pose at their first 1952 meeting in Shelton, Connecticut.

LEFT: Officers—Seated (l to r): Arthur S Nyquist, secretary; R C Geering, chairman; Carl Schilkowsky, vice-chairman; S V Vaniotis, treasurer. Standing (l to r): N J Glade, Ralph R Pezet, J B Dick and Oscar Edelstein, sectional committeemen; J E Lynn, Councilor.

RIGHT: Committee Chairmen—Seated (l to r): J E Lynn, Corporate Membership; Ralph R Pezet, Auditing. Standing (l to r): A N Henschel, Publicity; N J Glade, Membership; Oscar Edelstein, Nominating; John B Dick; Research. Joseph F Melody, Outing Chairman, and A F De Marco, Property Committee Chairman, were absent when photo was taken.

NOTICE TO AUTHORS OF PAPERS

MANUSCRIPTS for the *Proceedings* and for other publications of the American Association of Textile Chemists and Colorists shall conform to the requirements and standards given in this *Notice,* which was drawn up after considerable study. Before publication, manuscripts for the *Proceedings* shall be approved by the Editor, not only for editorial correctness according to the standards of this *Notice,* but also for content of technical matter. In his work, the Editor may enlist the aid of anonymous reviewers who are selected for expert knowledge in particular fields.

It is presumed that authors in studying the comments of reviewers and of the Editor will remember that all recommendations are made in a kindly, helpful, sympathetic manner to improve the paper in both literary and technical excellence. Although authors should cheerfully consider suggestions, they are expected to defend their position if justified, especially when strictly technical matters are involved with which the authors have an intimate knowledge.

MANUSCRIPTS—Manuscripts shall be typewritten double-spaced with approximately one-inch margins on 8.5 x 11-inch white paper. In addition to the original, at least one carbon copy is required. Pages are to be numbered consecutively with Arabic numerals, and each page after the first shall carry the authorship at the very top. Tables and figures shall also be numbered consecutively, the tables with headings containing Roman numerals as TABLE I, TABLE II, etc, and the figures with Arabic numerals as Figure 1, Figure 2, etc, appearing *below* the figures. The names of the authors and their laboratories or business connections should appear below the title of the paper.

ARTICLES APPEARING IN THE "PROCEEDINGS" IN RECENT ISSUES OF THE "AMERICAN DYESTUFF REPORTER" will be helpful to authors as models of form for the typing of manuscripts.

LITERARY STYLE AND FORM OF PRESENTATION—In the writing of papers, authors are requested to observe a trenchant, simple style of writing directed to textile chemists and colorists with at least an elementary knowledge of chemistry, physics, mathematics, engineering, textile processes and textile machinery.

In the organization of the material, there should be one or more introductory paragraphs setting forth the occasion, significance and main objectives of the paper and of the method of attack. This should be followed by the body of the presentation, either with discussions interspersed throughout this portion or with a collected section marked "DISCUSSION" after the main body of the paper. Finally, there shall be a brief section at the end entitled "SUMMARY" or "CONCLUSIONS."

Center headings should be employed sparingly and generally will include only very important section headings, such as "INTRODUCTION," "EXPERIMENTAL," "DISCUSSION," "CONCLUSIONS," "SUMMARY," and "REFERENCES." Side headings (see third paragraph of this *Notice* for an example) shall be indented and run into the text to which they apply, and shall be separated from the paragraph by a dash. The publisher will print center headings in bold-face capitals and side headings in capitals.

LITERATURE REFERENCES AND FOOTNOTES—References to the literature and all footnotes (except those in tables) shall be numbered consecutively with underlined Arabic numerals in parentheses at the proper place in the text. Where a reference or footnote is to be used again, the original number is simply repeated; this obviates the necessity of repeating the footnote or reference at the bottom of the page. References to the literature shall conform to the universal usages followed by *Chemical Abstracts,* which include underlining of book and journal names to indicate italicization in printing.

The spelling and rules of punctuation followed in manuscripts shall be those found in the *Merriam-Webster New International Dictionary;* abbreviations and chemical formulas shall conform to *Chemical Abstracts.* Periods shall be used only at the end of sentences, not after abbreviations.

FIGURES AND GRAPHS—Figures and graphs should be black line drawings on white drawing paper. Photographic prints are acceptable, preferably glossy prints on double-weight paper. Duplicates should be available for dispatch to reviewers. Diagrams and graphs should preferably be designed in long form to cover one column of print but may be two columns wide or the width of a full page where necessary. In graphs the frame and actual curves should be inked more heavily than the co-ordinate lines, and these latter should not be too close together. Various styles of broken lines are sometimes desirable to distinguish curves. Experimental points should be given with small plane figures, such as circles, squares, diamonds or triangles. Numbers and legends on co-ordinate axes are to be lettered in the graph by the author. Numbers and titles of figures should be placed below the diagram or on the edge of the back. Each piece of illustration copy should bear on the margin or on the edge of the back the name of the author and the title of the paper.

Photographs of authors should be included with copy, to be run in conjunction with the paper. These must be on glossy stock, and should be large enough for proper reproduction.

TABLES—Tables should not be used indiscriminately because they are very expensive to set up in type. They should be designed to be one column, two columns or three columns wide. Tables should be arranged with the view of conserving space; column headings should be short and abbreviated. Quantity designations shall never appear in the body of the table but in the headings. Tables, if possible, should be placed in the manuscript where they belong rather than separately.

SYNOPSIS—A separately written synopsis of not over 200 words containing the gist of the subject matter must accompany every manuscript.

GALLEY PROOFS—Galley proofs will be sent to the author by the publisher for correction before publication. This should not be interpreted as an invitation to rewrite the paper but rather as an opportunity to correct errors.

REPRINTS—Fifty reprints of papers published in the *Proceedings* will be furnished without charge by the publisher if requested when galley proofs are returned. These reprints are printed on one side of the sheet only and then stapled together. A schedule of prices of reprints in the usual form accompanies the galley proofs.

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TRADE-MARKS — As the AATCC wishes to co-operate in the protection of trade-marks, a list of all trade-mark names mentioned in an article will be placed in a separate paragraph ahead of the list of references. The author will therefore prepare such a list in capital letters under a center heading entitled "TRADE-MARKS", under which should appear the following sentence: "The following names used in the article above are trade-marks for the kinds of products for which the generic name follows the trade-mark name:"

To simplify editing and printing, it is requested that, in the body of the article, trade-mark names be written with only an initial capital letter and with no other references.

Courtesy demands that authors include competitive products as well as those of his firm. Many current trade-mark names are to be found in the *AATCC Technical Manual and Yearbook.* Examples of how trade-marks should be given in the paragraph for trade-marks are as follows:

ORLON, an acrylic fiber
NIAGARA, a direct dye
IGEPON, a synthetic detergent.

• PATENT DIGEST •

PAUL WENGRAF

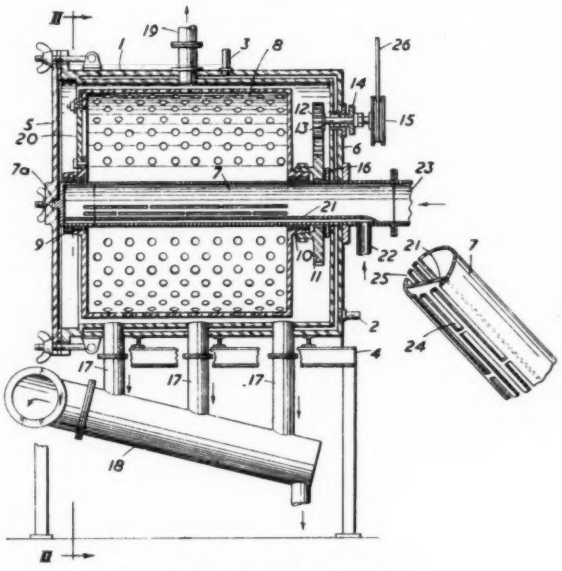


Figure 1—BP 655,779

APPARATUS FOR TREATING TEXTILES——Particularly for Chlorinating Wool A 2, 04

Brit P 655, 779
(Tootal Broadhurst Lee Co——Aug 1, 1951)

The construction described in this patent may be useful for treating all kinds of textiles and in a special case for chlorinating woolen material. The main purpose is to handle the goods in subsequent stages without removing them from the container in which they have to be treated with different liquids or gases, rinsing liquids, etc, and finally dried by applying reduced pressure.

A fixed container [1] is provided with door [5], which can be hermetically sealed by screws (see Fig 1). An inner container [8] rotates freely around a center pipe [7] partitioned by wall [21] in two compartments, one of them serving for the introduction of liquids [22], the other one [23] for gases. Both compartments contain longitudinal slots [24, 25].

Pipe [19] on top of container [1] is connected with a pump [36]—Fig 2—to exhaust gases or liquids from the vessel. The collected liquid can be measured by a show glass [34], indicating the amount of liquid withdrawn by the pump. Another outlet, provided with manifold [18] serves to discharge gases or liquids from the bottom of the vessel. A pipe [43] is connected with fan [44] to deliver gases through the heater [51] to pipe [23].

In operation, articles to be treated (e g, woolen hosiery) are fed into container [8]. Scouring liquid is introduced through pipes [63, 59 and 22] into the container and discharged after scouring through [53]. In a similar way rinsing water is admitted through [64] after which pump [37] is started to build up a vacuum in the container. Vapor coming from [43] is circulated by fan [44] and heated at [51] to effect evaporation. By measurement of the water quantity in show glass [34] the amount of moisture removed and, consequently, the moisture retained in the goods, can be controlled. Chlorine gas, to impart the wool antifelting properties, can be introduced by [45] and circulated the same way. Finally the goods are dechlorinated and dried by leading hot air through the same system.

Reference is made to devices for chlorinating woolen goods in closed vessels which can be evacuated, e g, Brit P 417,719 and 475,742 (Wool Ind Res). The present invention shows to advantage over these and similar devices in the control of moisture content and in effecting a series of operations without removal of the goods from the container.

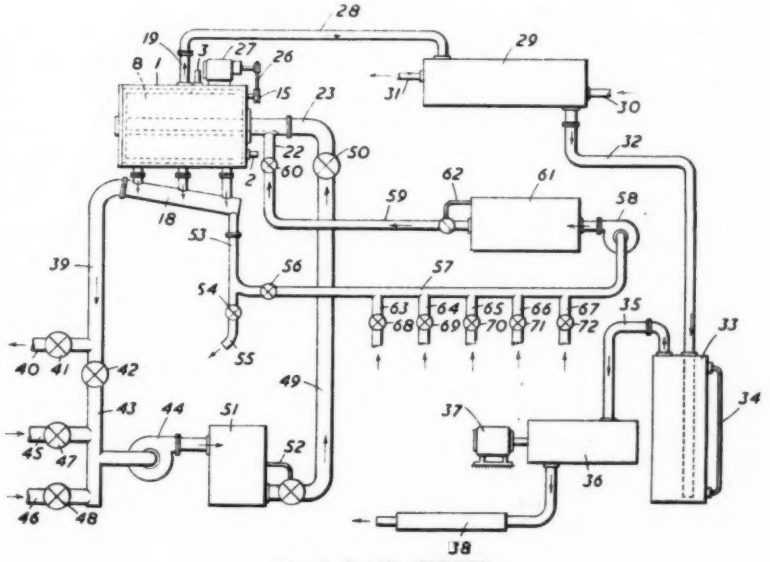


Figure 2—BP 655,779

DYEING WITH NITRO-AZO-DYES, Transformed by Reduction to Azoxycompounds

C 4, 01

Brit P 656,507
(General Aniline & Film Corp——Bestehorn——Aug 22, 1951)

The present process differs from known dyeing methods in that direct dyes bearing a NO_2- group are treated after dyeing with a mild reducing agent in order to change the nitro group, NO_2, into an azoxygroup, N-O-. Two or more of these resulting azoxy groups join together to form a new color compound containing at least two molecules of the original ("intermediate") type. The shade of the dyestuff so obtained is quite different from that of the intermediate dye and also exhibits greater depth and brilliance and improved fastness properties. The original ("intermediate") dyestuffs applied here are, preferably, of relatively low molecular size; it can be assumed that the spectacular change in all these properties is due particularly to the enlarged molecule formed by this method. On the other hand the dyestuff formed here *in situ* from smaller, well penetrating components, permeates the fiber in a desired way, thereby increasing the fastness properties in general.

The inventor states his awareness of the fact that azoxy dyestuffs have been hitherto produced by moderate reduction of nitro compounds. It is difficult however to control this reduction which easily goes beyond the azoxy stage. In contrast, the reducing process when carried out within the dyed fiber is automatically stopped at the azoxy stage. This reaction could not be foreseen.

Example: 2-amino-8-naphthol-6-sulfonic acid is coupled with diazotized 4-nitraniline sulfonic acid. The resulting substantive dyestuff is dyed on cotton at 70°C and 10% alkaline glucose solution is added. After 1½ hours a blue shade of excellent fastness properties, different from the original shades, is obtained.

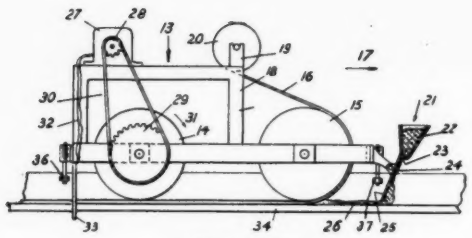
Six examples cite various water soluble azodyes containing nitro groups. In all these, alkaline technical glucose solutions are mentioned as mild reducing agents.

Theoretically, azoxy compounds obtained by moderate reduction of nitro compounds (Zinin, 1845) are transformed by further reduction into azo compounds. Apparently further coupling reactions occur with continued heating.

SCREEN PRINTING TABLE, Covered with a Permanently Sticking Adhesive

D, 4

Brit P 660,261
(Striker——Nov 7, 1951)



BP 660,261

The purpose of this invention is to replace the customary long screen printing tables with a simpler device, covered with felt or cloth to which the fabrics to be printed may be pinned by needles or the like.

Tables with mirror-smooth surfaces on which the cloth is pasted with gum arabic are not new. The drawback of this system, however, is that the adhesive has to be in a dry state before printing and that a fresh layer of adhesive has to be applied before every printing operation.

It is recommended that the printing table be covered with a permanent, slightly sticking adhesive, preferably a nonaqueous product of a waxy nature, optionally warmed to the melting point. No special wax composition is suggested in the patent. The details of the special mixture best suited for this operation should be interesting.

According to the drawing, a roll of fabric [20] is placed on top of carriage [13] on the left side of the table. The end of the fabric to be printed is introduced between roller [15] of this carriage and the top of the table. At the same time, container [22] is opened and the adhesive mixture flows through aperture [23] onto the table where it is distributed as a fine layer by means of plate [25]. A motor moving the carriage [13] in the direction marked by arrow [17] is started, whereby a length of the fabric is pasted on the table. After printing is completed, the length of fabric is removed and the carriage is pushed back again to the left end, ready to print a new portion. It is no longer necessary to spread new adhesive from container [22] since the sticky paste, ready for use, remains on the top of the table.

PRINTING TEXTILES BY PHOTOGRAPHIC METHODS—Indigosols, Catalyzed by Preprinted Prussian Blue

D, 2, 04

Can P 478,723
(General Aniline & Film Corp—Schoen—Nov 20, 1951)

Indigosol dyes may be developed by exposure to ultra-violet light. This reaction has been applied in USPat 1,918,623 of Ansco-Agfa Co. (The USPat 1,988,623 quoted in the specification is obviously erroneous.)

Indigosol prints are produced by impregnating a fabric with the dye solution and exposing it thereafter through a pattern to actinic light rays. Although this method seems to be very promising many technical difficulties that tend to make the application impractical have been experienced, particularly in exposing the wet impregnated fabrics.

The present invention claims to have solved the problem by an easier method. It has been observed that Prussian Blue formed *in situ* on the fiber (as usual in the preparation of blue prints on paper) acts as an effective catalyst in reoxidizing the Indigosol dye under the influence of light. Mild oxidizing agents, such as hydrogen peroxide, are added to the Indigosol solution. Powerful oxidants, such as permanganate, are excluded since they cause overall oxidation and also develop color on the portions that are not light-exposed.

Example: a cotton fabric is first padded with an aqueous solution of ammonium ferric citrate plus potassium ferricyanide. After drying, the fabric is exposed under a negative, resulting in a positive blue print of Prussian blue. The fabric is then treated at 70°C under slightly acid conditions at pH 5-6 (oxalic acid) for 5 minutes, and passed through a solution of the Indigosol of 6-6' dimethoxythioindigo (Indigosol Orange) plus hydrogen peroxide. Reoxidation takes place on the portions where Prussian Blue has been developed. By washing the goods in dilute NaOH, one may remove the unoxidized Indigosol, the undeveloped iron salts and the Prussian Blue print, thereby obtaining a clear orange print.

The developing of Indigosols of Indanthrene colors with mild oxidation promoters, such as mixtures of ferric and ferrous salts, is mentioned in Brit P 350,499 (Scottish Dyes Ltd). Sodium ferrocyanide itself is described as an oxidation catalyst in Brit P 583,115 (Ciba), among others (cf *Am Dyestuff Reptr* 36, 438, 1947).

STABILIZING CELLULOSIC TEXTILES——Ketone-Aldehyde-Starch Condensates

G, 2, 04

Brit P 661,376
(Dan River Mills——Nov 21, 1951)

This patent is apparently parallel to U S Pat 2,486,399 (cf *Am Dyestuff Reptr* 39, 99, 1950).

NEWS

• ASTM D-12 Meeting Set for March 17-18

In addition to committee reports and discussions involving its research and standardization activities in the field of soaps and other detergents, Committee D-12 of the American Society for Testing Materials has arranged for several technical papers dealing with the fields of metal cleaning and testing of detergents and also a symposium on Statistical Methods for the Detergent Laboratory.

The meetings will be held on March 17 and 18 at the Park-Sheraton Hotel in New York City. Those interested in the technical papers are invited to attend.

Papers tentatively scheduled include the following:

"Metal Cleaning Before Electroplating," H B Linford, Columbia University

"Metal Cleaning," William Stericker, Philadelphia Quartz Co

"Methods of Testing Detergents by Soil Cloth," J A Woodhead, Colgate-Palmolive-Peet Co

SYMPOSIUM ON STATISTICAL METHODS FOR THE DETERGENT LABORATORY

"Tests of Significance," P L Schmidt, Westinghouse Electric Corp

"Comparison of Variability," L Beck, Alexander Smith, Inc

"Statistical Treatment of Detergency Data," J Sherman and R Bernstein, Philadelphia Naval Shipyard

"The Importance of Correlations in Detergents Testing," J M Lambert and E J Leshan, General Aniline & Film Corp

"The Design of Laboratory Control of Commercial Launderies," G S Freeman and M I Cohn, American Conditioning House, Inc.

These papers will be summarized and discussed by O P Beckwith, Alexander Smith, Inc, for ASTM Committee E-11 on Quality Control of Materials.

Among the subcommittees which will meet is the reactivated group on Analysis of Synthetic Detergents. This Subcommittee T-2 is concerned with infrared analyses of synthetic detergents and there is to be a discussion of developments in this field.

COMING EVENTS

ACHEMA X
Exhibition Meeting for Chemical Engineering May 18-25, Frankfort/M, Germany.

AMERICAN CHEMICAL SOCIETY
7th National Chemical Exposition Sept 9-13, Chicago Coliseum, Chicago, Ill.

AMERICAN SOCIETY FOR TESTING MATERIALS
Spring Meeting and Committee Week, March 3-7, 1952, Cleveland, Ohio.

Annual Meeting, June 23-27, 1952, New York. N Y. (The biennial Apparatus and Photographic Exhibits will be held in conjunction with this meeting).

1953—Spring Meeting (Hotel Statler, Detroit, Mich.)

Annual Meeting (Chalfonte-Haddon Hall, Atlantic City, N J.)

1954—Spring Meeting (Shoreham Hotel, Washington, D C)

Annual Meeting (Sherman Hotel, Chicago, Ill.)

AMERICAN STANDARDS ASSOCIATION
3rd National Standardization Conference, Sept 8-10, Museum of Science and Industry, Chicago, Ill.

34th Annual Meeting, November 19, Waldorf-Astoria, New York, N Y.

BRITISH INDUSTRIES FAIR
May 5-16, London and Birmingham, England.

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS
Annual Meeting (Quebec Section) April 25-26, Mount Royal Hotel, Montreal, Que.

CANADIAN TEXTILE SEMINAR
September, Queen's University, Kingston, Ont.

CHICAGO INTERNATIONAL TRADE FAIR
Mar 22-April 6, Navy Pier, Chicago, Ill.

FIBER SOCIETY
Meeting: April 16-17, 1952 (Clemson House, Clemson, S C); Sept 10-11 (Princeton, N J).

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS
41st Knitting Arts Exhibition, April 27-May 1, 1953, Atlantic City Auditorium, Atlantic City, N J.

NATIONAL KNITTED OUTERWEAR ASSOCIATION and UNDERWEAR INSTITUTE
Knitting and Allied Crafts Exposition, April 21-25, Grand Central Palace, New York, N Y.

NATIONAL ASSOCIATION OF TEXTILE MACHINERY MANUFACTURERS
Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantc City, N J.

NEW YORK BOARD OF TRADE
26th Annual Dinner of the Drug, Chemical and Allied Trades: March 6, 1952.
26th Annual Meeting: September 25-28, Pocono Manor Inn, Pocono Manor, Pa.

PHI PSI FRATERNITY
49th Annual Convention, May 1-3, Clemson House, Clemson, S C.

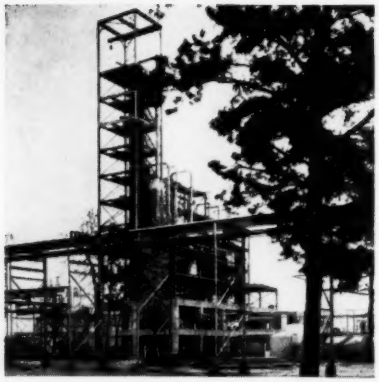
SOCIETE DE CHEMIE INDUSTRIELLE
25th International Congress for Industrial Chemistry, May 18-25, Paris, France.

SOCIETY OF PLASTICS INDUSTRY, INC
5th National Plastics Exposition, Mar 11-14, Convention Hall, Philadelphia, Pa.

TEXTILE INSTITUTE
Annual Conference, June 2-6, Edinburgh, Scotland.

OUT-OF-PRINT BOOKS WANTED

Dr Daniel P Norman, Director of Chemical Research, New England Spectrochemical Laboratories, County Road, Ipswich, Massachusetts is seeking a copy of "Wool Quality" by S G Barker (London, 1931) and a copy of "Textile Microscopy" by J M Preston (London, 1934). Both of these books are out of print and cannot be obtained through book dealers. Persons who have copies of these books for sale should contact Dr Norman.



The crude iso and normal butyraldehyde mixture coming from Texas Eastman's catalytic reactors is separated and refined in this distillation building at Longview, Texas. Part of the 2-ethylhexyl alcohol process is also carried out here.

• Operations Begin at Eastman's New Texas Plant

Natural gas and propane started flowing into a maze of pipelines, furnaces, reactors, condensers and columns with the opening of Tennessee Eastman Company's new 2400-acre Longview, Texas, plant the last week of January. The event served to climax a program initiated in Tennessee Eastman's research and development laboratories in Kingsport, Tenn, some six years ago and represents a step towards self-sufficiency so far as the company's raw materials are concerned.

The plant is being operated by Texas Eastman Company, another division of Eastman Kodak Company. The location, in the northeastern part of Texas, is reported to be ideal with an economical supply of natural gas and propane in ample quantities, a suitable water supply from the Sabine River, good transportation, and the type of people needed for the new plant's operations.

Because the Sabine is a small stream during most of the summer, Eastman has created a 300-acre horseshoe-shaped lake on its property by erecting a dam across a small creek. The major portion of the plant itself is located in the center of the "horseshoe". The plant is built around the steam plant and the reactor building. At one end are the units where natural gas, carbon dioxide and steam are brought together and cracked at high temperatures to provide synthesis gas for the Oxo process and hydrogen for subsequent hydrogenation reactions. At the other end propane is cracked and propylene and ethylene separated.

The propylene and snythesis gas from these two operations are fed under high pressure into catalytic reactors where a mixture of n-butyraldehyde and isobutyraldehyde is formed. The aldehyde mixture from the reactors is then separated and refined.

The ethylene from the propane cracking units is sent to the alcohol plant where it is converted directly into ethyl alcohol. The alcohol units will be the last to get into production, and probably will not be ready until April, 1952.

The production of n-butyraldehyde reportedly will be split three ways, a portion to be sold as the aldehyde, a portion shipped to Kingsport where it will be converted to alcohol and acid for use in manufacturing cellulose acetate butyrate and Tenite plastic, and a portion converted to 2-ethyl hexyl alcohol for use in manufacturing dioctyl phthalate in Kingsport.

The isobutyraldehyde production will also be split three ways, it is learned. One part will be available to industry as the aldehyde, another part will be converted to the alcohol, and a part will be converted to the acetate. Tests made in substituting the isobutyl alcohol and acetate in lacquer formulations currently using the n-butyl solvents reportedly show great promise.

The ethyl alcohol produced in Texas will be shipped to Kingsport for conversion into acetic acid, acetic anhydride and solvents such as ethyl acetate and isopropyl acetate.

While Texas Eastman is a division of Eastman Kodak Company, all of its products will be either used or sold by Tennessee Eastman. Initially some 400 people will be required to operate and maintain the Texas plant. Eastman points out that this relatively low number is possible due to extensive instrumentation and modern continuous processes. It is reported that over 50 miles of tubing are needed to connect all the automatic controllers and instruments used to keep the reactions balanced and progressing smoothly.

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• New Sound Color Film Shows Corrosion in Action

A new, sound color film, prepared under the direction of the Corrosion Engineering Section of The International Nickel Company, will be shown for the first time on March 11 at the annual conference and exhibition of the National Association of Corrosion Engineers at Galveston, Texas.

Entitled "Corrosion in Action", this sound color film, which is in three parts of two reels each, shows how corrosion works to cause an annual loss in industry and elsewhere estimated at over six billion dollars. It also shows how this damage can be avoided or controlled by various means, such as by the selection of corrosion-resistant materials, by the development of new alloys to meet given situations, by the use of electric currents to provide cathodic protection, and by other methods.

• PTI Awarded Government Certificate

Special recognition has been given by the United States Government to the Philadelphia Textile Institute for the role it is playing in supporting mutual American-European efforts to strengthen the free nations against communism.

A "Certificate of Cooperation", bearing the red, white and blue "Strength for the Free World" shield of the Economic Cooperation Administration, and a letter of citation signed by Acting ECA Administrator Richard M Bissell, Jr, were received recently by Bertrand W Hayward, PTI Director.

The certificate states that it is awarded in recognition of the firm's "furnishing technical assistance to the peoples of the Marshall Plan countries to aid them in maintaining individual liberty, free institutions and peace".

• 8000 Chemists to Participate in 121st ACS National Meeting

Recent progress in synthetic fiber development, New England resources for the chemical industry, trends in chemical education, and research achievements in petroleum chemistry will be discussed in some of the several hundred papers to be presented at the two sessions of the 121st national meeting of the American Chemical Society later this month. Approximately 8000 chemists and chemical engineers representing 139 local sections will participate in Buffalo, N Y from March 24 through 27 and in Milwaukee, Wis, from March 31 through April 3.

Dr Hans O Kauffmann, director of research and development of the Buffalo Electro-Chemical Company, Inc, has been chosen general chairman of the Buffalo session. Technical sessions will be held in the Statler, Buffalo, and Lafayette Hotels, with the Statler as headquarters. A general meeting will be held Monday evening, March 24.

Dr James F McKenna, chemist with the Pittsburgh Plate Glass Company in Milwaukee, is chairman of the Milwaukee session. Registration and most of the technical sessions will be held in the Milwaukee Auditorium. Headquarters will be in the Hotel Schroeder. A general meeting will be held Tuesday, April 1.

Eight $1,000 awards will be conferred upon outstanding chemists and chemical engineers in the course of the two-week meeting, and the 1952 Garvan Medal for distinguished service to chemistry by a woman scientist also will be presented. Fifty-five chemists and chemical engineers who have completed 50 consecutive years as members of the Society will receive certificates.

Trips by the visiting chemists and chemical engineers to industrial plants and laboratories in the neighborhoods of the host cities are being arranged by local committees. Group meals for various college, university, and scientific organizations are scheduled. Committees have also been appointed to conduct special programs in each city for women chemists and wives of chemists participating in the meeting. An employment clearing house will be set up in each city to provide opportunities for employers to interview chemists and chemical engineers seeking new connections.

The divided meeting was arranged to permit the attendance of the greatest possible number of the Society's members. Composed of more than 67,000 chemists and chemical engineers, the Society is the world's largest professional association of scientists.

Dr Robert P Brecht

• Plastics Conference To Hear Office Management Authority

Dr Robert P Brecht, president of the National Office Management Association, will address the Plastics Conference to be held in conjunction with the Fifth National Plastics Exposition which takes place next week in Convention Hall, Philadelphia. Dr Brecht, opening speaker in the first conference session at 10 AM Wednesday, March 12, will speak on "Modern Management Techniques".

• NATMM Changes Name

The National Association of Textile Machinery Manufacturers acted to change its name to the American Textile Machinery Association (effective immediately) during the annual meeting, held on Feb 5 at the Sheraton-Plaza Hotel, Boston, Mass. The reason given for the change was to have the name of the Association more concise and easier to handle in correspondence, publicity and related matters.

The following officers and directors were elected for the ensuing year:

President—J Hugh Bolton, Whitin Machine Works

Vice President—Frederick W Howe, Jr, Crompton and Knowles Loom Works

Treasurer—Samuel F Rockwell, Davis & Furber Machine Co

Secretary—Mac F Thompson, Whitin Machine Works

Directors—J Hugh Bolton; Frederick W Howe Jr; Samuel F Rockwell; W Frank Lowell, Saco-Lowell Shops; Thomas H West, Draper Corporation; Roy G Ross, Barber-Coleman Co; James H Hunter, James Hunter Machine Co; J Ebert Butterworth, H W Butterworth & Sons Co; Robert Leeson, Universal Winding Co.

William K Child, vice-president in charge of sales, Draper Corporation, was chosen by the officers and directors to be chairman of the Committee planning the 1954 American Textile Exhibit in Atlantic City, New Jersey.

• Yarn-Dyed Stripes and Checks in Tricot

Du Pont has announced the initial availability of tricot fabrics of 15-denier nylon in yarn-dyed stripes and checks. Through the development of a new processing technique, Native Laces & Textiles have created striped and checked tricot of the fine yarn with patterns claimed to be truer than those made by printing, previously the only suitable method for such sheer nylon fabrics. Their success in dyeing the yarn on the cone reportedly has produced beautifully clean-edged patterns, opening up new style possibilities for blouses, dresses and lingerie. The development also is said to permit retention of a fine hand in tricot fabrics.

Introduced in a white ground with fine lines of red, green, navy or black, the yarn-dyed tricot will be offered later with colored grounds striped or checked with white or contrasting color, it is learned. Formula and development of the dye process is confined to Native Laces.

The process is said to assure color fastness to heat setting, and to make the colors highly resistant to fading from washing and from exposure to gas or sunlight.

Easily laundered and quick-drying, the striped tricot, named "Candylon", has inspired a variety of unusual style effects in blouses.

• ITT Membership Meeting Attracts Over 115

Roger Milliken, Chairman of the Board of Trustees, Institute of Textile Technology, greeted more than 115 prominent textile mill executives at the Institute's recent Annual Membership Meeting.

The members of the Institute reviewed eleven projects which have been emphasized during the last quarter. These included the recent findings on a new source of tar-like spots on cotton fabric and methods of eliminating them; a completion of the project on the ITT Uniformity Analyzer to measure the uniformity of sliver, roving, and yarn, and the fulfillment of plans for Brush Development Company to manufacture, sell, and adequately service the machine.

The visiting mill members also heard a panel discussion on "Practical Benefits Obtained by the mills from Membership in the Institute". The discussion was led by M Earl Heard, vice president in charge of research, West Point Manufacturing Company, West Point, Ga.

•Concern Expressed Over Possibilities of Nonuniform Legislation Resulting From Sweater Fires

The concern of many testing laboratories, that periodic public pressure may hasten legislation governing flammability, which may do as much harm as good if not properly administered, is well reflected in a recent release by the United States Testing Company, Inc, Hoboken, N J.

The text of the release follows:

'The United States Testing Company has conducted research in ease of ignition and rate of burning of materials designed for wearing apparel dating back to the late thirties. The Testing Company assisted in the development of the Standard Flammability Tester of the American Association of Textile Chemists and Colorists, and now manufactures this instrument for sale to the industry. The test apparatus provides a standard means for gauging the ease with which fabrics such as those used in the sweaters will take fire and the rate at which they burn after ignition takes place. At the time Federal legislation was under consideration before the Committee on Interstate and Foreign Commerce of the House of Representatives in March of 1947, the Testing Company performed thousands of tests in accordance with methods described in the proposed pieces of legislation. Highly napped materials such as those from which the sweaters were manufactured were tested at that time and manufacturers were advised that the material was of such a nature that it would be considered hazardous to the wearer. The great bulk of material of that class was removed from the market at that time; so were the pyroxylin-coated fabrics of light weight which had been used to some extent in clothing materials. The industry accomplished these acts on a voluntary basis using laboratory testing as a means of gauging the degree of hazard in the product.

"It becomes quite apparent that in order to draft legislation to restrict the sale of highly flammable materials, laboratory techniques must be used at the various stages of manufacture of a textile article. Any attempt to draft legislation without due consideration to the test technique would result in a high degree of confusion in the entire textile industry.

"The term 'brushed rayon' has been applied quite generally in connection with the sweaters. The classification is considered technically correct in the case of the particular garments that have come to the attention of the United States Testing Company. However, it must be realized that 'brushed rayon' is a broad classification of goods and that it is only by scientific control testing that the classification can be broken down into fabrics of normal flammability, those that are questionable, and those that are considered a hazard to the wearer.

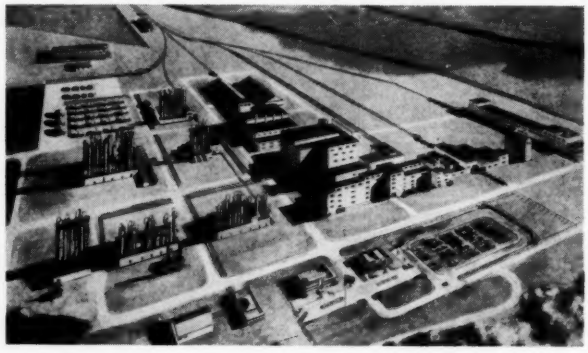
"Police Departments in various towns and cities throughout the country, have been swamped with garments which people suspect because they either purchased them from street peddlers or obtained them from unknown sources as gifts. Many of the garments were found to be so constructed that they were of no particular hazard. There are many factors which must be understood in order to determine whether a garment is or is not of a hazardous nature. The Testing Company explains that the type of fiber used in the fabric may not be of prime importance even though the cellulose fibers such as cotton and rayon, have a different reaction to flame than acetate, nylon, wool, silk, and some of the other fibers. The method in which the fibers are arranged in the yarn and fabric, and the amount of napping, influence the rate of burning. There is no particular hazard offered by flat rayon or cotton fabrics as everyone must realize. It is only when a large quantity of loose fiber is piled on the surface of a fabric that it presents an easily ignitable and rapid burning condition. The construction of the fabric enters into the rate of burning in much the same manner that making a pile of shavings of a block of wood changes the burning characteristics of this form of cellulose.

"The textile finish enters into the question of the rate of burning of textile materials both from a standpoint of rendering the material nonflammable by use of fire retardant compounds or, on the other hand, by adding decorative or finishing materials which in themselves ignite easily and add to the rate of burning.

"Even under present conditions, where legislation governing the sale of flammable textiles is in force in only one State, the Testing Company has to be equipped with test apparatus specifically for that State, as well as three other testing units in partial use on a nation-wide scale. If legislation must be drawn, the Testing Company feels that it should be on a national level in order that laboratories throughout the country can be equipped to conduct the huge volume of testing necessary to weed-out those materials which are apt to present a hazard or require special fire retardant finishing.

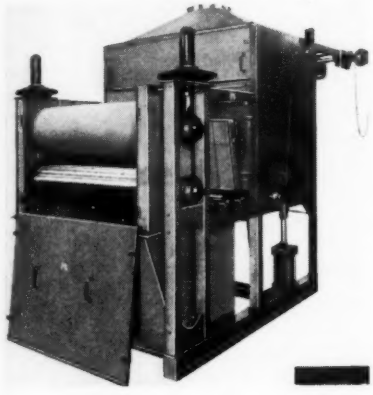
"As a public service, the United States Testing Company has offered its services to Police Chiefs in receipt of quantities of garments which have been turned in to them for testing purposes. The main laboratories in Hoboken, New Jersey stand ready to give an expert opinion on samples representative of the various types of garments that the city officials have on hand.

"The sample sweater which the United States Testing Company has on hand has been identified as having a viscose rayon backing fabric of circular knit construction with a tightly curled nap of viscose rayon with a depth of about one-eighth of an inch. The material, in standard tests made in accordance with the American Association of Textile Chemists and Colorists test method, was found to burn at a rate of 1.2 seconds for a five inch length of specimen. A satisfactory rate of burning would exceed seven seconds in a case where the backing fabric ignites. The particular sample on which this rate of burning was obtained was submitted by Police Chief Sommerrock of Ridgewood, New Jersey, as one which had been turned over to him as a result of his investigation."



An artist's view of the new $50,000,000 petrochemical and textile fiber plant now being constructed at Edmonton, Alberta, by the Canadian Chemical Company, Ltd, an affiliate of the Celanese Corporation of America. The plant, which reportedly will employ about 700, will produce petroleum chemicals, cellulose acetate, acetate filament yarn and acetate staple fiber. Completion of construction is planned for next winter.

NEW PRODUCTS AND DEVELOPMENTS



Cook-P & N Vertical Singer with Automatic Knockoff

• Vertical Singeing Machine Features Automatic Knockoff

An automatic knockoff that functions quickly if the cloth breaks or burns is one of the outstanding features of a new machine for vertical singeing developed by Cook-P & N Machine Co, 65 Dorchester Ave, Boston 27, Mass.

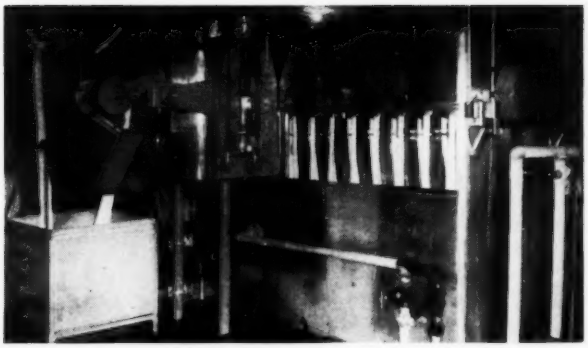
The cloth is also taken off the machine by automatic means when the machine is stopped. The wet-out section is equipped with rubber and stainless steel covered rolls with pneumatic pressure. The wet end is guarded for splashing at speeds up to 350 ypm.

• Capryl Alcohol Prices Reduced For Third Time

Sharp reductions in the price of capryl alcohol, the third such cut since mid-August, were announced on Feb 13 by Rohm & Haas Co. The 95% grade was reduced from 20¼ to 15c per pound in tank car lots, f o b Philadelphia. The 85% grade is now priced at 13½c per pound, against a former price of 17½.

Capryl alcohol finds its principal use in the manufacture of ester-type plasticizers for vinyl resins. It is also used in the preparation of solvent-soluble urea-formaldehyde resins for coatings, as an antifoaming agent, and as a low cost high boiling solvent.

Rohm & Haas points out that the steady increase in sebacic acid production, over the past several years, has now assured the continuing large-scale availability of the by-product, capryl alcohol. The price reduction is being made to encourage stable markets for the alcohol.



James Hunter Flexreel Washer

• Controlled Tension Washer Applied to Knit Goods

The successful application of a controlled tension washer on a complete range of knit goods has been announced by the James Hunter Machine Company, North Adams, Mass. In one of the leading knit goods mills, the installation of a Flexreel Washer reportedly has displaced two slack-type units and has speeded up washing to 200 ypm while effecting important savings in labor, steam, water, chemicals, etc.

The basic principle of flexible reels is held responsible for the Flexreel's success in answering the problems of excessive shrinkage and stretch that are inherent in the washing of tubular knit fabrics.

• Central Announces Full Range of Orlon Shades

A full range of colors in filament Orlon, ranging from pale pastels to deep shades of navy, brown and black, has been announced by the Central Yarn and Dyeing Company, Gastonia, N C. The shades reportedly are being packaged dyed under pressure.

According to Herbert Girard, director of research and development, more than forty different colors have been dyed successfully since the company first announced a line of colors for Orlon filament yarn. Additional shades are being developed, and the company reportedly hopes to offer as complete a range in Orlon filament shades as it has already developed in cotton, silk, and other synthetic yarns.

Mr Girard stated that the company had only recently overcome the problem of crocking in the heavy shades. The entire line of colors is claimed to have good fastness to crocking, and excellent fastness to washing and perspiration.

According to company officials, facilities for handling and dyeing filament Orlon and Dacron are being expanded, as a result of the interest shown in the new shades by hosiery, outerwear, upholstery, and dress goods manufacturers.

• Roller Printing of Dynel Developed

Successful roller printing of 100% dynel fabrics is now possible on a commercial basis, according to Decora Corporation, New York. Dynel fabrics printed by a new technique are reported to have excellent fastness to washing and crocking and to retain the soft hand of the original cloth. The method of production is reported to take advantage of experience with vinyl films. A full range of bright colors is said to be available, including blacks, whites, pastels, and deep shades.

One of the major problems encountered in achieving soft printed goods is the control of the temperature for curing the ink. Exact control of the temperature is said to be an important factor so as not to harshen the fabric, although slight harshening can generally be removed by a simple scouring.

An unexpected advantage of the printed fabrics is reported in their high resistance to sunlight. Fade-O-Meter tests are said to indicate that the printed areas have a light fastness of 80 hours or more, so that good overall sun fastness is achieved by printing fabrics with a light background color over the entire surface and then surprinting the design in the desired colors.

The excellent washability of dynel is not lost by this method of printing, it is claimed. Printed fabrics reportedly have shown no bleeding or fading after repeated 45-minute washings at 160°F. Since the printed goods are also reported to be highly resistant to crocking, this new printing process appears to offer good qualities for use in upholstery, in coverlets and in slip covers. Since the dried vinyl resin ink is in itself noninflammable and certan dynel fabrics have already been approved as fire resistive for use in public places, the printed fabrics hold excellent promise for draperies for use in places of public assembly, on aircraft and shipboard.

• Steverlynck Static Pressure Dyeing Machine

Baudoin Steverlynck, Teinturie de Groeninghe, Courtrai, Belgium, inventor of the Steverlynck static pressure dyeing machine, has furnished details of this machine and dyeing process.

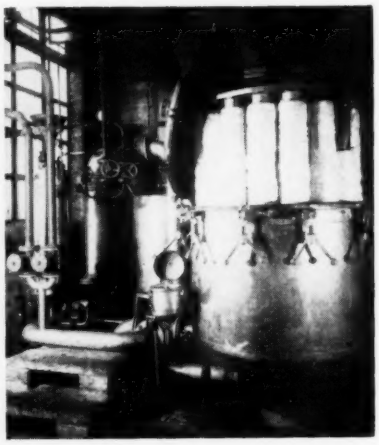
Under increased pressure water boils at a higher temperature, which principle is applied in the Steverlynck machine, reportedly to insure that the centrifugal pump delivers efficiently even at temperatures in the range of 100 to 150°C. Active boiling is avoided by depressing the vapor pressure of water. The material to be dyed is placed in a completely closed circuit, the water of which is placed under higher pressure than the atmosphere. The dyebath is heated indirectly by means of a steam heat exchanger and, by expanding, produces a higher than atmospheric pressure in the machine. This compensates for the increase in vapor pressure of the water brought about by the rising temperature and prevents the water from boiling. In the absence of boiling, the centrifugal pump is said to function at complete efficiency during all phases of the dyeing process.

The static pressure which makes possible the use of smaller pumps is achieved by means of an expansion chamber in which a small quantity of air is compressed by the expansion of the dyebath or by the use of compressed air or high pressure water. This expansion chamber is also employed as the salting or shading box and the main circulation of the machine may be directed by means of valves through this chamber. The chamber is mounted on the suction side of the pump. During shading, the expansion chamber may be closed from the main circuit of circulation thus allowing shading to proceed while the dyebath continues to circulate and remain under pressure. The heat exchanger unit may also be used for cooling by circulating cold water in place of steam.

In high temperature dyeing it is said that the dispersion and solubility of most dyestuffs takes place very rapidly thus favoring levelness and penetration of the material during a short dyeing period. It is claimed that this dyeing method yields perfectly level results on rayon cakes with all types of dyestuffs in a much shorter time than normally. It is further claimed that cakes of all sizes, shapes and deniers may be dyed successfully and that rayon, linen and cotton bobbins, as well as all textile materials in the loose form may be dyed in a minimum of time with maximum levelness. In the case of wool, the machine reportedly facilitates the use of dyestuffs which are normally applied with precaution on wool yarn bobbins. It is stated that dyeing at higher than atmospheric pressure has no harmful effect on the wool fiber, and that the process will yield satisfactory results on some of the new synthetic fibers in 10 to 15 minutes without any deterioration of the fiber taking place. It is also said that solid shades may be obtained on many fiber mixtures using normal colors.

(Left) Steverlynck Laboratory Apparatus

(Below) A view of the Steverlynck Apparatus in Their Dye-House



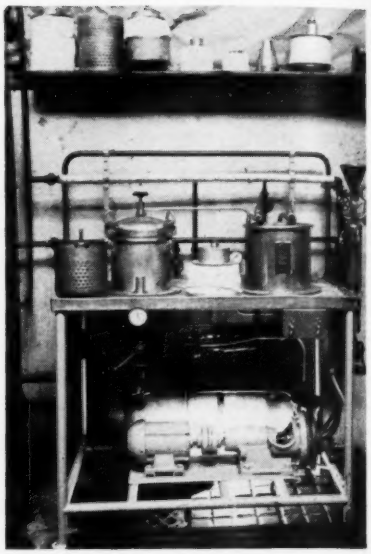
The same holder may be used for dyeing bobbins and cakes; other holders are available for hanks, loose materials and worsted slubbing tops.

The method has been used on an industrial scale for dyeing rayon cakes for a period of three years. The machine was patented in Holland in 1949 and patents have been applied for in all industrial countries for both the machine and the process.

• National Adds to Vinyl Acetate Copolymer Line

Adding to its line of vinyl acetate copolymers, National Adhesives Division of National Starch Products, Inc, 270 Madison Ave, New York 16, N Y, is now offering them in water emulsion form as well as in solvent solution. These resin bases, which can be supplied in a wide range of molecular weights and in concentrations ranging from low to unusually high solids content, are said to give adhesion to a variety of difficult surfaces.

The water emulsion form gives the user certain advantages of economy and ease of handling, the company points out. Since water is the vehicle, there is no problem of solvent odor, toxicity, or flammability, and the emulsions can be thinned with water on the spot to the required solids content.



• New Cyanamid Surface Active Agent Doing Well

American Cyanamid Company has announced that the stability and good detergent, rewetting and surface-tension-lowering characteristics of its new surface active agent, Decerosol SE, have indicated its usefulness to numerous industries, including textiles.

In experimental use in the textile industry, it reportedly has proved an extremely efficient aid in stripping vat-dyed rayon and cotton fabrics and in stripping metalized dyes from wool. In applying metallized dyes to wool, Decerosol SE is said to permit a reduction as much as 50% in the amount of sulfuric acid in the bath. When used with a suitable nonionic surface active agent, it reduces scumming of the dyebath, increases the color value, improves dye levelling and reduces cracking, according to Cyanamid.

The new product is said to be an active detergent in acid media, in hard water, and in salt solutions, and is an effective cationic scouring agent for wool and other textile fibers.

As a wetting agent, Decerosol SE is reported to be effective for both textile and paper, and when applied to cellulosic materials, to reverse the normally negative surface charge to produce a positive surface charge, thereby making the products substantive to anionic materials.

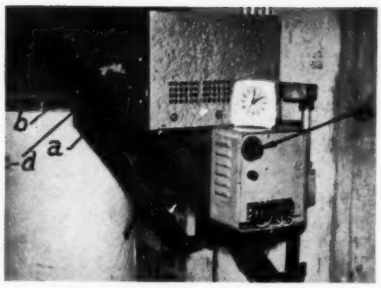
The new product, a quaternary ammonium compound, is a 50% solution of stearamidopropyldinethyl-B-hydroxyethyl-ammonium chloride in an isopropanol-water mixture. It is a light straw-colored liquid, soluble in water in all proportions.

• New Cadgene Unit Features Constant Speed and Tension Control

A new automatic tension control system, embodying constant speed and constant tension control on web or filament winds or unwinds moving through processing machinery, has been developed by the Cadgene Machinery Company, Inc, Paterson 4, N J.

The usual tension control consists of the conventional loop of the web or filament passing over two rollers and around a third on the end of a dancer arm or a similar arrangement. Tension is applied to the dancer arm by means of an adjustable spring or weight, or combination of both, and transmitted to the loop by the dancer arm roller.

As the dancer arm is forced up by the web or down by the loading, it actuates a voltage control which is designed to automatically make intermittent corrections for maintaining the constant tension for which the unit is set. In this way Cadgene seeks to eliminate all hunting. The corrections are intermittent, and few small corrections are made on each roll.



Control panel for the Cadgene Automatic Tension Control Systems includes a) voltage indicator; b) rate of response control; c) and d) manual increase and decrease; and e) d c tension range control.

An adjusted value of low voltage DC current is fed into an oil-immersed electromagnetic brake or clutch, depending on whether it is applied on an unwind or a wind-up. The "oil shear" provides the light tensions while friction is effectively used for heavy duty. Oil also provides the cooling medium (thereby keeping the friction coefficient the same). In a continuous web machine, it is stated, no adjustments have to be made unless the product or the tension on the product requires a change, though such adjustments can be made before or after starting the machine. Applications without dancer rolls where tacky materials are handled are also possible, the company states.

The device is said to be suitable for high or low speed operation, tensions being adjustable from 0 to several pounds per inch of web-width. Suitable sizes of the device are reported available for tensions requiring torques up to 1800 foot-pounds. Lineal speed remains constant.

TECHNICAL LITERATURE

Quartermaster Research on Water Resistant Textiles

Research and Development Report
Textile Series Report No 37
Office of the Quartermaster General
Department of the Army
Washington 25, D C

This major report of work conducted by the OQG over a period of years contains a great deal of information not heretofore published. It has been released for public information by the Office of Technical Services, U S Department of Commerce.

Actually, the report was prepared by the staff of the Harris Research Laboratory based on work done at the laboratory and also at the QM Research and Development Laboratories, the Quartermaster Board, the Institute of Textile Technology, and the National Bureau of Standards. It represents a summary of Quartermaster research in the field of water resistance of textiles carried out during World War II and in the period immediately following. A broad program of research covering both fundamental and applied aspects of the subject was undertaken as a result of the recognized importance of protection from rainfall to the fighting efficiency of the combat soldier.

The program included investigations of the physics of wetting; study of the effect of fabric structure and geometry on the water resistance of textile materials; investigations of the mechanism of water repellency with special emphasis on the study of treating systems and the durability of water repellent agents; study of the influence of garment design on protection from rainfall, including analysis of the double layer principle; and the development of test methods for predicting the performance of water resistant fabrics under field usage conditions.

Among the more important results of this research program was the development of a series of nozzles which duplicated natural rainfall in the three important parameters of intensity, drop size and velocity. The rain room and rain course established as a result of this development facilitated the design of a large number of fabrics of superior water resistance. Use of the rain room also permitted a more exact evaluation of the effect of structure on the resistance to penetration and absorption of textile materials. These data led to the revision of previous concepts and the formulation of some new concepts regarding the design of water resistant materials which will probably lead to further improvements in the future. Study of factors affecting the durability of water repellent agents has led to specific improvements in application technology and to the development of improved laundering procedures to maintain the effectiveness of the water repellent fabrics in use. Considerable progress is also noted in the design of water repellent garments. The utilization of the double layer principle and introduction of the use of water repellent thread have both led to significant improvements in the performance of water repellent garments.

While the practical developments cited in this report have been of great value in improving the over-all efficiency of water resistant materials, the fundamental investigations of the mechanism of wetting and the application of the principles of Peirce to the study of the geometry of water resistant structures is of significant importance and will undoubtedly form the basis for future progress in the development of water repellent agents and water resistant structures.

Degradation From Weathering of Tentage Fabrics

W E C Yelland (Harris Research Laboratories)
Research and Development Report
Textile Series Report No 40
Office of the Quartermaster General
Department of the Army
Washington 25, D C
(Released for public information by the Office of Technical Services, U S Department of Commerce).

This report discusses principally the degradative behavior of 12.29 ounce duck exposed outdoors at two locations in the grey state, the mineral dyed state, and with a fire, water, weather and mildew resistant finish. The reaction of these samples to varying climatic conditions and to different portions of the solar spectrum was observed. In general, the portion of the spectrum found to be most responsible for deterioration was the short wave length ultraviolet, but it was also observed that the various finishes were influenced by other bands of the spectrum as well.

At Camp Lee, Virginia, and Miami, Florida—sites representative of temperate and semi-tropical climates, respectively—

the samples were exposed both directly to the elements and under filters which permitted the passage of selected wave lengths of light. It was found that, in general, the FWWMR treated fabrics withstood degradation more effectively than either the mineral dyed or the grey. Deterioration in all cases seemed to be the result of hydrolysis and oxidation of the cellulose.

Correlation was established between fabrics exposed in the form of panels and those exposed in the form of tents to determine whether the more convenient panel exposures yielded reliable data.

Degradation of the fabrics was determined initially on the basis of exposure time and later, on the basis of the solar radiation received. It was found that the latter procedure was more reliable because of the differences in solar radiation at the two locations.

New GDC Circulars

General Dyestuff Corporation, 435 Hudson Street, New York, N Y, has released the following circulars, which contain descriptive material, applications, properties, samples, etc:

G-694—Fastusol Brown 5GA
G-697—Celliton Black BGA for Printing
G-698—Celliton Fast Violet 6BA-CF for Printing
G-699—Indanthrene Brilliant Green B Double Extra Paste Fine
G-700—Celliton Fast Pink BA-CF
AP-16—Nekal BX High Conc in the Textile Industry

FASTUSOL BROWN 5GA is a new, straight, direct dyestuff recommended by GDC for yellowish-brown shades on cotton and rayon. It is said to possess good to excellent light fastness, and to be especially suitable for rayon dress goods that are to receive an anticrease finish or to be discharge-printed or to be after-treated with Solidogen WF Pdr and copper salt for improvement of light and wash fastness. This new brown is also suitable for use on silk.

CELLITON BLACK BGA for PRINTING is designed especially for printing black, and also grey, shades on acetate fabrics. It may likewise be printed as a blue black on nylon by use of the formulation for acetate. This new printing brand is said to be characterized by superiority over the usual printing blacks in resistance to sublimation and in freedom from speck formation when prints are steamed with or without pressure.

CELLITON FAST VIOLET 6BA-CF for PRINTING is a straight, dispersed, anthraquinone-type dyestuff for printing acetate and also nylon fabrics. It reportedly produces very bright bluish-violet shades on acetate of very good light fastness, which are claimed especially useful for brilliant patterns on dress, necktie and bathing-suit fabrics. The shades of prints on nylon are said to be distinctly bluer than on acetate but equally good tinctorially. Fastness properties of this dyestuff on nylon are reported to be about the same as on acetate, except for fastness to atmospheric fading, which is excellent (5) on nylon but poor (1) on acetate.

INDANTHRENE BRILLIANT GREEN B DOUBLE EXTRA PASTE FINE is a straight anthraquinone vat dyestuff (CI 1101) standardized especially for screen and roller printing. It reportedly produces bright, bluish-green shades of very good tinctorial value on cotton and rayon with very good (6) fastness to light in tints and excellent-to-maximum (7-8) fastness in full shades. The wet fastness of these prints is also reported to be superior, the fastness to severe washing (AATCC Wash Test #4) excellent (5), the fastness to chlorine bleaching (0.3% active solution), very good (4), and the fastness to caustic soda or mercerizing concentration very-good-to-excellent (4-5). A bright green of such fastness properties is said to be particularly useful for printing upholstery fabrics, draperies, curtains, and other materials that are subject to severe light exposure during normal use. It is also said to be valuable for printing wash-fast shirtings, table cloths and dress goods. Excellent resistance to weather gives this dyestuff an important place in the printing of ducks for beach umbrellas and awnings and a further use is for cotton materials that are to be over-printed with caustic soda for plissé effects.

CELLITON FAST PINK BA-CF is a straight, dispersed type of anthraquinone dyestuff manufactured for the direct dyeing of bright, fast-to-light, pink shades on acetate textiles; it is also useful for dyeing nylon.

NEKAL BX HIGH CONC is an anionic surface-active agent reportedly having excellent wetting, penetrating, dispersing, stabilizing, and emulsifying properties. It is reportedly finding wide use as a textile processing aid in the preparation, dyeing, and finishing of all types of fibers.

Nylon Technical Service Bulletin 2-2.01 "Tensile Strength & Elongation"

Rayon Department
E I du Pont de Nemours & Co Inc
Wilmington 98, Delaware
Available on request

This bulletin is designed for inclusion in the Nylon Technical Service Manual, replacing the present bulletin of the same title, page 2.01, in the Physical-Chemical Properties section of the Manual.

Taber Abraser Specimen Holders

Bulletin 5105
Taber Instrument Corp
133 Goundry Street
North Tonawanda, N Y
Available on request

Besides showing the new 1952 model Taber Abraser on the cover, this bulletin illustrates and describes in detail several new type specimen holders for use in both the portable and heavy duty laboratory type abrasers.

Production Control Systems and Procedures

Management Controls Division
Remington Rand Inc
315 Fourth Avenue
New York 10, N Y
Available on request

This book details a unique method of materials control that is designed to shorten the production planning cycle while speeding production by eliminating the causes of varied delays on the production line.

Fully illustrated with typical forms and procedure charts, the book outlines complete procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Included is a typical case history which reviews an installation that has been a successful operation for several years.

Ask for publication X-1268.

OBITUARY

ARTHUR B RAY

DR ARTHUR B RAY, sales manager of the Special Products Division, Carbide and Carbon Chemicals Company, died suddenly on Christmas eve in Port Washington, N Y, it is learned. He was 62.

Considered one of the country's foremost authorities on activated carbon, Dr Ray was among the first to develop a process for producing it from coconut shells. He joined Union Carbide in 1919 as a research chemist with the National Carbon Company, a UC & C Division.

CORTLAND A MEHL

CORTLAND A MEHL, a New York District salesman for the American Cyanamid Company's Industrial Chemicals Division, died of a heart attack on January 23rd at the House of Good Samaritan Hospital in Watertown, N Y, where he was traveling for the firm. He was 36.

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